

BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

Vol. 53]

1956

[No. 1

EDITORIAL NOTE

It has been felt that the format of the *Tropical Diseases Bulletin*, adopted as a wartime economy, made reading difficult. Beginning with this number, we have remedied this defect by shortening the line of print and allowing more space between the lines, while leaving the general appearance of the *Bulletin* unchanged.

SUMMARY OF RECENT ABSTRACTS *

I. CHOLERA †

General: Epidemiology

SWAROOP and POLLITZER (p. 769) have continued the extensive account of cholera published by WHO [see this *Bulletin*, 1954, v. 51, 1154], and give an account of world incidence since 1923. They define certain endemic foci in India and Burma; these are related to water systems near the coast and at a low level, and are densely populated, but it has not been possible to trace the manner in which infection is maintained in them, or the method of infection from patient to patient, especially in inter-epidemic periods. This is a serious gap in the understanding of the disease. Other large areas of India suffer from epidemics but are often free, in the inter-epidemic periods, and are therefore not endemic zones. The authors discuss the influence of pilgrimages and festivals, and of seasonal changes, and they go on to describe the

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1955, v. 52. Reference to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on cholera in this series, see the January issues of the *Tropical Diseases Bulletin* each year since 1939.

incidence of the disease during the period under review, in various countries individually. POLLITZER (p. 1192) continued this series of papers with a comprehensive account of the bacteriology of *V. cholerae*. He gives details of morphology, cultural characteristics, biochemical properties, vital resistance and viability outside the body, but the antigenic characters are not included in his survey. These papers refer to a large body of literature, and besides giving a clear analysis of the many discovered facts will serve as valuable sources of reference.

A general review of cholera in Israel and the Near East has been published by OLITZKI (p. 447).

LEARMONTH (p. 535) has constructed a map of cholera in Indo-Pakistan in which are indicated the intensity of incidence (in 3 grades) and the variability of incidence (also in 3 grades). The method of presentation by shading is successful in demonstrating easily the relationship between intensity and variability.

The clam *Meretrix casta* is found abundantly in river estuaries on the east coast of India, and is used extensively as food. It is known that cholera occurs in the fishermen engaged in collecting these clams, and ABRAHAM (p. 448) investigated the possibility that clams could form a reservoir of the vibrios, but the results showed that although they can ingest *V. cholerae*, and the organisms can survive in them for 3 days (in diminishing numbers), there is no evidence of multiplication. Nevertheless, the clams show a high coliform index, and should be regarded as unsafe to eat raw.

Aetiology

SARKAR and TRIBEDI (p. 153) discuss the growth and survival of the cholera vibrio in relation to pH. The reason why it grows well in peptone water is probably that the buffering action of the peptone prevents appreciable lowering of the pH. The reactions of natural waters are important, and the pH values found in the region of Calcutta (mostly about 8.0 or more) provide conditions of alkalinity favourable to the vibrio. OGASAWARA and KARIYA (p. 974) show that *V. cholerae* may produce an adaptive lysine decarboxylase enzyme at acid pH values.

It has previously been shown that *V. cholerae* throws off rough variants under the action of specific dissociating agents, and BHASKARAN (p. 362) shows that rosaniline is effective for this purpose. He describes his experiments on growth on Douglas agar to which various substances, including rosaniline, were added, and the resulting smooth-rough dissociation, which was not transitory. There were marked differences in antigenic structure between smooth strains and their rough variants; the latter were comparatively non-virulent.

In two papers JUDE and GALLUT (pp. 630, 631) report work on the virulence and toxigenic capacity of *V. cholerae* (Ogawa strain). Virulence appears to depend on the temperature of incubation of the strain *in vitro* before inoculation into the animal, and is maximal after incubation at

18°C.; at 37°C. virulence is progressively lost with each subculture. Virulence depends on toxicity, and not on any antigen similar to the Vi antigen of *Salm. typhi*. Passage of a strain in cultures from 20° to 41°C. renders the strain much less toxigenic, and this change is not reversible. No loss of toxicity is to be expected in strains kept at laboratory temperatures. The increased toxicity observed on cultivation at relatively low temperatures may reflect the high toxicity of strains isolated from patients in the algid stage of the disease. GALLUT (p. 1193) shows that the toxicity of the Inaba strain also varies inversely with the temperature at which the organism is incubated, and that at low temperatures this strain is more toxic than the Ogawa strain. This confirms the clinical observation that the Inaba strains occur in epidemics with high mortality, whereas the Ogawa strains are associated with endemic cholera and reduced mortality.

MALIZIA (p. 154) has tested certain organisms of the Bethesda and Arizona groups for agglutination with sera prepared against Inaba and Ogawa strains of *V. cholerae*. He concludes that there is an antigenic relationship between some of the organisms and some strains of the cholera vibrio, and that it is fairly close in the case of the Bethesda organisms.

In an investigation of an outbreak of acute (but mild) gastro-enteritis during the Kumbh fair, India, 1954, YAJNIK and PRASAD (p. 447) isolated non-agglutinable vibrios from river water and from patients; no agglutinable vibrios were found. The authors, in discussing the rôle of non-agglutinable vibrios, conclude that they may have been responsible for the outbreak, and that such cholera-like outbreaks should be treated as cholera for preventive purposes. Anti-cholera inoculation had been enforced during the period of this fair.

Pathology: Tests

Renal changes in patients who died of cholera, in the stage of shock or reaction or uraemia, showed patchy ischaemia of the cortex, and medullary congestion; in the stage of post-choleraic anaemia there was also necrosis of the cortical tubules. DE *et al.* (p. 42) think that cortical vasospasm was responsible for the complete cessation of urinary secretion where this occurred, but probably not for the tissue changes. In a histochemical examination of the suprarenal glands in cholera DE *et al.* (p. 775) conclude that depletion of lipid material from the cortex may be associated with increased liberation of cortical hormone, and that the suprarenals play an active part in cholera by such enhanced synthesis.

CHAKRAVARTI and CHAUDHURI (p. 363) have estimated by flame photometry the plasma sodium and potassium in cholera. In a number of fatal cases due to anaemia and pulmonary oedema, in which saline treatment had been given, the sodium and chloride values varied but the potassium and blood urea were high. The findings indicate that the fluid

lost in cholera is isotonic with extracellular fluid, but the potassium content of the extracellular fluid increases as fluid is lost, probably as a result of migration of potassium from the cells. If renal function is normal, any excess of saline administered is readily eliminated, and the danger of pulmonary oedema is remote; but if renal function is impaired, great care should be taken in administering saline. The kidneys may fail to excrete potassium, and this probably contributes to the fatal termination.

Observations on the venous pressure and the circulation time have been made in cholera by CHAKRABORTY (p. 774), who observed in general a lengthening of circulation time before administration of saline infusions, and a reduction after administration. Venous pressure was usually within normal limits when the circulation time was prolonged; after saline it was increased.

GALLUT (p. 632) discusses the value of the agglutination reaction in the retrospective diagnosis of cholera, and concludes that complete reliance cannot be placed on this reaction because it is not absolutely specific, in that O agglutinins may be present in the serum of patients harbouring vibrios other than *V. cholerae*; moreover, infection with *Brucella* may lead to agglutination of the Inaba strain of *V. cholerae*. Great caution, therefore, should be exercised in interpreting a positive reaction in a person whose serological history is not known; the only place for the reaction is in the control of anti-cholera vaccination, where comparisons of titres before and after are made, and even in this respect it is an assumption that the formation of agglutinins runs parallel with the formation of protective antibodies.

FELSENFELD *et al.* (p. 973) have been able to demonstrate that the haemagglutination phenomenon can be obtained when red cells (man, rabbit or sheep), sensitized by exposure to a killed suspension of *V. cholerae* and subsequently washed, are tested against homologous antisera from experimental animals. The test can be performed by both the tube and the slide methods, and should be of some value in the examination of cholera sera.

Treatment

From a comparison of results obtained in cholera by treatment with phthalylsulphathiazole, chloramphenicol and aureomycin, NARAYANA RAO *et al.* (p. 776) conclude that aureomycin may be of some specific value.

Hitherto no laboratory animal has proved entirely suitable for use in chemotherapeutic studies on cholera, but DUTTA and HABBU (p. 974) have now found that rabbits aged 10 days are susceptible to virulent strains and that the infection resembles human cholera in many respects. They tested various drugs; chloramphenicol, aureomycin and oxytetracycline were prophylactic but non-curative in action, and sulphaguanidine had some prophylactic action.

Charles Wilcocks

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control; Animal malaria—monkeys, other animals, birds.

CHECHELNITSKAYA, S. M. & BAYGULOVA, S. A. [**Duration of Tertian Malaria with Long and Short Incubation Periods**] *Med. Parasit. & Parasitic Dis.* Moscow. 1955, v. 24, No. 3, 217–20, 4 charts. [In Russian.]

The authors report observations carried out in the course of 3 years (1948–51) on the duration of tertian malarial infection in the Stalin, Sverdlov and Kirov districts of Kazan. The total number of patients observed continuously for 24–30 months was 1,820, in 1,102 of whom the onset of the disease followed a long incubation period, while in 718 patients the incubation period was short. The duration of the infection in patients of the first group was either 15–18 months or up to 26 months, while that in patients of the 2nd group was either 6–9 or 15–18 months. In both cases the longer periods were found in patients living under conditions of greater exposure to infection, and are therefore attributed to re-infections, whereas the shorter periods corresponded to conditions when the risk of infection was slight. C. A. Hoare

BLACK, R. H. **Deaths from Malaria on the Australian Mainland.** *Med. J. Australia.* 1955, Mar. 12, v. 1, No. 11, 387–8.

The 47 deaths from malaria in Australia in the 7 years 1946–52 amounted to more than half the number of deaths due to this disease in Australian Army patients during the war years. The malaria fatality rate per 1,000 cases in the Australian Army (1939–1945), among European patients in Papua-New Guinea (1947–1952), and in Australia (1947–1952) were: 0·38, 3·6 and 8·9, respectively. The figure of 8·9 per 1,000 is 23 times greater than the wartime Army figures and does not include New South Wales. For the period 1947–1952 New South Wales contributed one-third of the total amount of deaths due to malaria in the whole of Australia but unfortunately the number of cases is unknown. The Papua-New Guinea figures are selective, as they refer to the more serious cases which are dealt with in hospital and do not take into account the many non-fatal attacks of malaria which are treated by the patient himself.

Malignant tertian, not benign tertian, is the type of malaria which kills; so far as Australia is concerned malignant tertian is an imported disease.

The awareness of medical practitioners of the possibility of malaria as a diagnosis has waned since the war, and there is a large body of younger graduates who have not had the experience of malaria gained by service

medical officers during the war years. Typhoid fever, formerly common in Australia but now rare, remains entrenched in the thought pattern of differential diagnosis and is well remembered to-day; malaria might well take its place beside typhoid in this respect. Experience shows that there is frequently a long delay between the onset of symptoms and diagnosis of locally acquired benign tertian malaria.

A feature of the post-war years has been aerial travel which enables people who have resided in highly malarious areas to arrive in any part of Australia within the incubation period of malignant tertian malaria. An additional complication is that the regular use of suppressive drugs by such people has prevented the occurrence of an overt attack of malaria and in consequence they are not familiar with the symptoms of onset, should they occur in Australia.

Epidemic malaria is not unknown; an example occurred 20 years ago in the north of Western Australia; over 200 indigenous and white people died of malignant tertian malaria before a correct diagnosis was established.

It is suggested that a suitably worded pamphlet be handed to people entering Australia from malarious areas, by the Customs officer at the port or airport of entry.

R. Ford Tredre

CERVANTES GONZÁLEZ, D. Estudios malariológicos en la huasteca potosina 1949-1954. [**Studies of Malaria in Huasteca Potosina, 1949-54**] *Bol. Epidemiológico*. Mexico. 1954, Oct.-Dec., v. 18, No. 4, 130-54, 6 figs., 11 graphs & 7 maps.

Huasteca is the name of a region of Mexico between 21° and 22°N. on the eastern versant of the Sierra Madre Oriental, extending along the middle and lower reaches of Pánuco River. Huasteca Potosina occupies the eastern portion of the State of San Luis Potosí and covers an area of about 20,000 square kilometres. It has 17 *municipios* with a combined population of 253,759. A description is given of the physical geography, climate, flora and fauna of the area, and of the occupations, living and social conditions of its inhabitants. More than half the total number of deaths were attributed to malaria, but 90 per cent. of deaths are registered without any accompanying medical certificate as to the cause of death. The number of deaths attributed to malaria is a gross overestimate.

Malaria surveys have shown that the malaria vectors, in order of importance, are *Anopheles albimanus*, *A. punctimacula*, *A. quadrimaculatus*, *A. pseudopunctipennis* and *A. crucians bradleyi*. Blood examinations show that 86.8 per cent. of infections were *P. vivax*, 10.6 per cent. *P. falciparum* and the remainder mixed infections of these two species. In 1949 residual spraying of dwellings with DDT was begun. The measure was costly and therefore suspended. A severe outbreak of malaria in 1951 followed extensive flooding that resulted from a cyclone.

Spraying measures were restarted in 1953 and are being systematically continued. The resultant reduction in malaria morbidity and mortality rates and in the spleen and parasite rates of children is encouraging.

Norman White

RACHOU, R. G., FERREIRA, M. O., LÔBO, A. G. S. & PIRES, W. M.
Considerações gerais sôbre a epidemiologia da malária no sul do Brasil. [**General Observations on the Epidemiology of Malaria in the South of Brazil**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1954, Apr., v. 6, No. 2, 177-88, 3 graphs & 2 maps.

The English summary appended to the paper is as follows:—

“In the south of Brazil, malaria is transmitted by *A. (K.) cruzii*, *A. (K.) bellator*, *A. (N.) darlingi* and probably *A. (N.) albitarsis*. On the coast, the two species of the subgenus *Kerteszia* are responsible for endemic malaria. *A. (N.) darlingi* is found in the north of Paraná State, part of which has endemic malaria and part epidemic malaria with long periodicity (4, 5 or 6 years). In the Valley of Uruguai River are little foci of epidemic malaria, probably transmitted by *A. (N.) albitarsis*. The control of malaria in the region, no matter the different vectors, has been made quite satisfactory by the DDT house spraying.”

SENEVET, G. & ANDARELLI, L., with the collaboration of E. ABONNENC.
Les soies antépalmées chez les larves d'Anophèles. [**The Antepalpmate Hairs in Anopheline Larvae**] *Arch. Inst. Pasteur d'Algérie*. 1955, June, v. 33, No. 2, 106-27, 1 fig.

The first part of this paper is of interest to systematic entomologists who are concerned in the classification of anopheline mosquitoes. It is a taxonomic study of the variations which have been observed to occur in the nature of the antepalpmate hair (or hair No. 2) on the dorsal side of the abdominal segments of the larvae of these mosquitoes.

From a summary of published information the authors draw their conclusions and discuss the importance of the character of this hair in the classification of anopheline groups, subgenera and series of species.

Making use of the data thus provided they have compiled a key, presented in the second part of the paper, for the identification of the larvae of species of *Anopheles* which occur, or might be expected to occur, in North Africa.

H. S. Leeson

SALITERNIK, Z. **The Specific Biological Characteristics of *Anopheles (Myzomyia) sergentii* (Theo.) and their correlation with Malaria Control in Israel.** *Bull. Entom. Res.* 1955, Aug., v. 46, Pt. 2, 445-62, 9 figs. on 2 pls. & 5 text figs. [13 refs.]

These observations on *Anopheles sergenti* in Israel were made during the period 1938 to 1943 before the introduction of modern insecticides,

and in the years 1946 to 1952 after their introduction and countrywide use. At the present time this mosquito is the most important vector of malaria in Israel, and occurs in greatest density in the valleys of the Jordan, the Huleh and the Beisan and various localities in the Negev. In this paper the author discusses certain aspects of morphology and biology.

Very little water is required for the maintenance of the aquatic stages and they are able to withstand considerable changes of temperature. In the laboratory pupae have survived freezing for an hour and later produced normal adults. In the field larvae cling to banks of streams and stones and are able to withstand strong and sudden flushes of water.

The quickest development occurs from May to September when with water temperatures at 30°C. the mosquito undergoes its complete cycle from egg to adult in 9 days. In winter development takes 3 months. Optimal water temperature occurs between 23° and 28°C. but some shade is necessary. There is a general autumn increase in numbers and the winter is passed in all stages. The number of gravid females rises from August and reaches its peak in October after which time eggs are laid at a reduced rate throughout the winter, there being no hibernation in this species.

Females feed on man and animals indoors and outside at night and occasionally in the early evening. Wind movements assist in the dispersal of this species and individuals have been found 6 km. from their breeding place. In one settlement there were indications that many of the female mosquitoes were infected on arrival. The presence of males in the collection does not, as in some other anophelines, indicate proximity of breeding place.

Traps are described for the study of this mosquito in its outdoor and indoor resting places and for assisting in the assessing of the efficacy of insecticides. Field methods are also described for the quick recognition of egg, larva and adult.

Residual DDT spraying of all potential resting places is practised during the months of September to November up to about 6 km. from breeding places in conjunction with the usual antilarval measures.

H. S. Leeson

SENEVET, G., ANDARELLI, L. & ADDA, R. Présence d'*Anopheles plumbeus* St. sur le littoral algérien. [**Presence of *Anopheles plumbeus* on the Algerian Littoral**] Arch. Inst. Pasteur d'Algérie. 1955, June, v. 33, No. 2, 138-9.

The authors record the finding of larvae of *Anopheles plumbeus* in January 1955 in a flower vase in the cemetery at Bône, Algeria, which is not much above sea-level.

This is the fourth record for Algeria, but the other localities were at altitudes of about 1,100 metres.

Comments are made on the place of collection, the unusual nature of the breeding place and the time of year.

H. S. Leeson

SENEVET, G. & ANDARELLI, L. Races et variétés de l'*Anopheles claviger* Meigen, 1804. [**Races and Varieties of *Anopheles claviger***] *Arch. Inst. Pasteur d'Algérie*. 1955, June, v. 33, No. 2, 128-37, 2 figs.

MORIN, H. G. S. Vers une conception utilitaire de l'exophilie anophélienne. [**A Utilitarian Conception of Anopheline Exophilism**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 3, 337-42, 1 fig.

The author quotes two examples to illustrate that while it is well known that entomology is of value in the elucidation of epidemiological problems, epidemiology can be of use to the progress of entomology itself. The question of the zoophilic tendencies of *Anopheles hyrcanus sinensis* and its relation to human malaria in some areas is discussed.

The second example is taken from an antimalarial campaign at Yaoundé in the southern French Cameroons. *Anopheles gambiae* was too rarely taken to indicate the rôle it played in the transmission of the disease, and since it was not known whether the insect bit inside houses or out of doors, it was doubtful whether domestic prophylactic measures would prove successful. The problem was solved by the examination of blood from different age-groups at different seasons. It was found that when there was a low incidence of microfilariae of *Loa loa* and *Dipetalonema perstans* (known to be transmitted by *Chrysops* and *Culicoides*, respectively, both of which bite outside), that of malaria was high. The reverse was also true. This was taken to indicate that the anopheline attacked inside houses and that domestic prophylactic measures should be successful.

G. Crisp

SMITH, A. **The Distribution of Resting *A. gambiae* Giles and *A. funestus* Giles in Circular and Rectangular Mud Walled Huts on Ukara Island, Tanganyika.** *East African Med. J.* 1955, Aug., v. 32, No. 8, 325-9.

Circular mud huts are confined almost entirely to the southern tip of the island of Ukara, Tanganyika. The grass roof is cone-shaped and supported on a framework of cane. A partition, not complete to the roof, divides the hut into two parts; cattle are kept on one side of the partition in some huts. Otherwise they are occupied only by adolescent people; goats are absent, and fires are unusual. As an average, a hut contains 3.2 persons and 0.4 cattle.

Few rectangular mud huts occur on the island. The roof is usually of grass. They are divided by an incomplete partition. Sometimes cattle

are kept in them besides people; but never goats. The average density of cattle and people per hut is very similar to that for the circular huts.

Anopheles gambiae was fairly evenly distributed in such huts on each side of the dividing partition, which is to one side of the doorway, but *A. funestus* showed some concentration towards the rather darker half of the hut behind the partition. The percentages of both species resting below roof level was between 61 and 70 per cent. The comparatively even distribution of mosquitoes throughout a hut, notwithstanding a tendency to some concentration in certain parts, is attributed to the fairly uniform light conditions within the huts.

The total catches in 20 huts in the long rains of April show the relative numbers of different species taken, but the daily catch is not calculable from the data given. The catches were:

				Female	Male
<i>A. gambiae</i>	...	...	...	2,880	1,173
<i>A. funestus</i>	...	...	...	123	21
<i>A. pharoensis</i>	...	...	...	4	—
<i>A. rufipes</i>	...	...	...	1	—
<i>Culex annulioris</i>	...	...	...	12	1
<i>C. univittatus</i>	...	...	...	2	—
<i>C. decens</i>	...	...	...	1	1
<i>T. africanus</i>	...	...	...	5	—
<i>Aedes [sic] africanus</i>	...	...	...	1	—

[This short paper has numerous errors. We doubt, for example, that a circular hut is 1 ft. 6 in. in diameter. The two references are referred to once each, but accepted methods of doing so are ignored. And do we accept "*Aedes africanus*" as *Aedes africanus*—or presume, perhaps, that *T. africanus* was intended?]

D. S. Bertram

KRISHNAN, K. S. Incrimination of Malaria Vector in Vindhya Pradesh

—Further Notes. [Research Notes.] *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1955, May, v. 3, No. 3, 93-4.

In July 1954, the author found sporozoites of malaria parasites in *Anopheles fluviatilis* in Vindhya Pradesh, India. Thereafter during the transmission season (July–November) more dissections were carried out. The results are shown in a table. Throughout the period 5 *A. fluviatilis* out of 159 dissected showed sporozoites in the salivary glands. Gland infections were also found in 3 of 5,246 *A. culicifacies*, but all of 1,111 *A. annularis* were negative.

All the infected mosquitoes were collected in unsprayed villages, except one specimen of *A. culicifacies* which was from an unsprayed cattleshed (deliberately left for experimental purposes) in a sprayed village. In a neighbouring house, the owner had refused to have spraying

done. The author points to the danger of leaving any structure unsprayed in a controlled area, especially where *A. culicifacies* is a vector.

H. J. O'D. Burke-Gaffney

KRISHNAN, K. S. **Malaria Transmission Table for India.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1954, Sept., v. 2, No. 5, 183, 1 folding table.

The malaria vectors and transmission seasons in different parts of India have been presented in the form of a table. The number of regions or districts within regions totals 22. The following examples illustrate the value of the table. In the Punjab *A. culicifacies* is the vector and the transmission season commences in the first week of July, with a peak in the first week of October, and terminates at the end of October. In the western Ghats and Nilgiris, *A. fluviatilis* is the vector and the transmission season commences mid-January, reaches its peak in the first half of June and terminates at the first week of July. In the irrigation tracts of Mysore State, *A. fluviatilis* and *A. culicifacies* are vectors practically throughout the year.

It is expected that as more information becomes available from newly investigated localities the table may become progressively more accurate.

R. Ford Tredre

BLACK, R. H. **Observations on the Behaviour of *Anopheles farauti* Laveran, an Important Malaria Vector in the Territory of Papua-New Guinea.** *Med. J. Australia.* 1955, June 25, v. 1, No. 26, 949-55, 5 figs. [39 refs.]

Observations made on the behaviour of *Anopheles farauti* in Papua-New Guinea from 1952 to 1954 indicate that its indoor resting habits are sufficient to encourage a policy in this territory of malaria control by residual insecticides. A pilot experiment is planned. The paper provides details on resting places out of doors, besides preferred positions inside dwellings, biting activity, choice of hosts, and breeding places. Pig is not an unusual host and there are positive precipitin tests also for dog.

D. S. Bertram

LAIRD, M. **Mosquitos and Malaria in the Hill Country of the New Hebrides and Solomon Islands.** *Bull. Entom. Res.* 1955, Aug., v. 46, Pt. 2, 275-89, 3 figs. [23 refs.]

Few observations have been published concerning the occurrence of the Pacific anophelines in mountainous country. The data presented in this paper were collected in the course of brief visits to hill villages of Espiritu Santo, New Hebrides, and Guadalcanal, Solomon Islands.

The only anopheline, *Anopheles farauti*, that occurs in the New Hebrides was found on Espiritu Santo along the Nevaka river up to

1,100 feet, 12 miles from the coast. *Plasmodium vivax* and *P. malariae* were found in the blood of children in the hill villages, most of whom had never visited the coast, though the villages do not afford suitable larval habitats, and are inaccessible to anophelines breeding elsewhere. From these facts it is concluded that the children had contracted malaria during overnight prawning trips to the valleys below their homes, where infected people returning from the coast had initially infected the valley anophelines.

On Guadalcanal the proven vector of malaria, *Anopheles punctulatus*, breeds at altitudes up to at least 1,900 feet. Like those of the New Hebrides, Guadalcanal hill villages show no nearby larval habitats and the infected children seen there could have become infected during visits to valley villages or lowland cultivations. Neither *P. falciparum* nor *Wuchereria bancrofti* were recorded from the hill districts visited. *Anopheles solomonis* was collected from a mountain stream at 3,000 feet but the significance of this species as a vector of *Plasmodium* remains unknown.

Some features of the larval morphology of these anophelines and of several culicines are discussed and illustrated in a systematic appendix.

H. S. Leeson

FLOCH, H. Exophilie des anophèles et transmission résiduelle du paludisme. [**Exophilism in Mosquitoes and Residual Transmission of Malaria**] Arch. Inst. Pasteur de la Guyane Française. Publication No. 346. 1954, Nov., 7 pp.

[Not for the first time, e.g., this *Bulletin*, 1955, v. 52, 514, Colonel Floch finds himself in disagreement over the interpretation of his (Floch's) published results by Professor J. SAUTET.]

The decline of malaria in French Guiana is undoubted, but on the strength of figures for 1950 Sautet concludes [this *Bulletin*, 1954, v. 51, 343; *Presse Médicale*, 1953, v. 61, 836] that a low endemic degree of malaria exists, kept up by exophilic mosquitoes not affected by house-spraying campaigns. The danger of a return of high malarial rates, therefore, is ever present.

Commenting on these conclusions, the author points out that the house-spraying campaign started only in 1949, and that the 1950 malaria figures have been greatly improved since then. The percentage reduction, on pre-campaign malaria incidence figures, was 79 per cent. in 1950 but 98.6 per cent. in 1953.

It is considered that the virtual elimination of malaria (11 positive blood examinations out of 997 in 1953) shows that the near elimination of a single species, *Anopheles darlingi*, has been sufficient. The other 20 species of *Anopheles* present, including *A. aquasalis*, have played an insufficient part to keep endemic malaria going. It is not pretended that these conclusions apply necessarily in other countries.

It is not thought that all danger has ceased. A careful watch must be kept on the "wild" forest *A. darlingi*, exophilic and zoophilic in its original habitat but believed to be the same *A. darlingi* which is exclusively endophilic and anthropophilic in the inhabited areas of French Guiana.

B. B. Waddy

MELVIN, Dorothy M. **The Microscopical Detection and Identification of Malaria Parasites in Preparations from Clotted Blood.** *Amer. J. Trop. Med. & Hyg.* 1955, July, v. 4, No. 4, 712-15.

Occasionally the laboratory may be required to make a blood examination for malaria as an afterthought, when only clotted blood is available. The author studied the possibilities of this procedure and in particular whether species differentiation was possible in such preparations.

Venous blood was obtained from known cases of malaria of each type and allowed to clot at room temperature: half of each sample was then stored at room temperature (summer and winter) and the other half in the refrigerator. Thick films from finger pricks served as controls.

Thick films from the clot were made with cotton swabs: they required to be thinner than usual thick films because of difficulty in adhesion to the slide. All films were dried at room temperature overnight and stained for 45 minutes in a 1 in 50 dilution of Giemsa stain buffered to pH 7.0. Better results were obtained if the experimental films were rinsed for 1 to 2 minutes instead of the usual 3 to 5 minutes. Staining was improved by the addition of 0.1 per cent. or 0.01 per cent. Triton X-100 to the buffered water.

Parasite counts were made. It was found that longer periods of examination were required than in the case of the controls.

The results were as follows:

Number of days malaria parasites were detected and identified in clotted blood stored at various temperatures

Species	Parasite detection (days)			Species identification (days)		
	Room temp. (80-95° F.)	Room temp. (50-60° F.)	Refrig. (40° F.)	Room temp. (80-95° F.)	Room temp. (50-60° F.)	Refrig. (40° F.)
<i>P. vivax</i>	2 to 4	4 to 5	5 to 9	1 to 3	2 to 4	3 to 5
<i>P. malariae</i>	—	—	10 to 12	—	—	7 to 12
<i>P. ovale</i>	1 to 2	—	5 to 7	1	—	4 to 5
<i>P. falciparum</i>	4 to 5	5 to 8	7 to 9	3 to 5	5 to 7	5 to 9

Cells and parasites were more distorted in the specimens from clotted blood. This degeneration increased with the age of the clot, as did deterioration in staining.

The ratio of parasites and leucocytes in clotted blood on the first day

after collection was increased over that of the controls. At the higher temperatures the parasite counts decreased progressively and after 2 to 5 days, it was difficult to find parasites. At the lower temperatures counts remained fairly constant for 5 to 7 days.

The appearance of the parasites is described. It is evident that trophozoites of *P. malariae* retained their specific characters for longer than the other species.

It is concluded that malaria parasites can be identified in blood clots for 1 to 9 days or more, depending on temperature, and that species can be differentiated for nearly as long, but distortion and poor staining may make identification of species progressively difficult and even impossible after several days, especially where parasitaemia is low.

H. J. O'D. Burke-Gaffney

See also p. 94, FAWDRY, **Syndrome of Splenomegaly, Anaemia, and Hepatomegaly often Left-Lobed, in South Arabia.**

ESTÈVE, H. La chlorpromazine (4560 RP) dans le traitement de l'accès pernicieux palustre. Essais cliniques en milieu africain, Centre Medical d'Oyem, Gabon (A.E.F.). [**Chlorpromazine in the Treatment of Pernicious Attacks of Malaria in Africans in Gabon, French Equatorial Africa**] *Méd. Trop.* Marseilles. 1955, May-June, v. 15, No. 3, 335-41.

Various doses of chlorpromazine [Largactil; 4560 RP] were given by various routes to patients suffering from pernicious *P. falciparum* malaria [see this *Bulletin*, 1954, v. 51, 673]. The author reviews the effects clinically and gives details of the treatment and progress of 9 African infants and 2 European adults.

He concludes that the drug is especially useful in patients displaying nervous system signs and symptoms, including convulsions.

[The evidence presented is difficult to evaluate, since all the patients mentioned received other forms of treatment including antimalarial drugs, and, from case to case, parenteral fluids, various cardiac tonics, vitamins, strychnine, etc.]

The author states his opinion that Largactil is useful and defends his therapeutic gallimaufry thus: "*L'usage de plusieurs médicaments est toujours d'un pouvoir thérapeutique supérieur à l'utilisation exclusive d'un seul.*"

B. G. Maeraith

ALVING, A. S., ARNOLD, J., HOCKWALD, R. S., CLAYMAN, C. B., DERN, R. J., BEUTLER, E. & FLANAGAN, C. L. **Potentiality of the Curative Action of Primaquine in vivax Malaria by Quinine and Chloroquine.** *J. Lab. & Clin. Med.* 1955, Aug., v. 46, No. 2, 301-6. [22 refs.]

Three groups of 19 Caucasian volunteers without history of exposure to malaria were infected with *Plasmodium vivax* (Chesson strain). Infection

was carried out by mosquito bite, the same 10 mosquitoes being used in rotation in groups of 3 men, one from each experimental group.

All exhibited parasitaemia and fever before the fourteenth day after infection. Treatment was begun immediately after patients developed fever of 102° F. and parasites had been demonstrated for two consecutive days.

The following drug régimes were administered:

Group 1 received quinine followed by primaquine: 2 gm. quinine sulphate were administered in six divided doses daily for 14 days; after an interval of 2 days to allow the excretion of quinine, primaquine was given in doses of 15 mgm. (base) in six divided daily doses for a further 14 days.

Group 2 received quinine concurrently with primaquine. Quinine was given as above for 14 days together with a total daily dose of 15 mgm. (base) primaquine.

Group 3 received chloroquine concurrently with primaquine: 15 mgm. of primaquine (base) were given in six divided doses daily for 14 days. On the first day 0.6 gm. chloroquine base was given and followed in 24 hours by 0.4 gm. (a dose of chloroquine known to be adequate for dealing with trophozoites of the Chesson strain).

In Group 1 there were 15 relapses; in Group 2 only one; in Group 3 five. Relapses all occurred subsequent to the interval (30 days) regarded as the limit for recrudescences.

The authors consider that the results demonstrate potentiation of the action of primaquine by either concurrent quinine or concurrent chloroquine.

B. G. Maegraith

ELDERFIELD, R. C., CLAFLIN, Elizabeth F., MERTEL, Holly E., McCURDY, O. L., MITCH, R. T., VER NOOY, C. D., WARK, B. H. & WEMPEN, Iris M. **Further Syntheses of Primaquine Analogs.** *J. Amer. Chem. Soc.* 1955, Sept. 20, v. 77, No. 18, 4819-22. [Refs. in footnotes.]

EDESON, J. F. B., WILSON, T., TURNER, L. H. & LAING, A. B. G. **Studies on the Chemotherapy of Malaria. IV. The Treatment of Acute Malaria with Amodiaquin (Camoquin).** *Med. J. Malaya.* 1955, June, v. 9, No. 4, 252-9, 2 figs. [12 refs.]

The effects of oral dosage with amodiaquine dihydrochloride dihydrate was watched in cases of *P. falciparum* and *P. vivax* malaria in a local Asian population over a period of 5 years. Only the responses to the acute attack were studied: follow-up of relapses was not possible.

Patients with light and moderate infections with *P. falciparum* (191 cases) were given single doses of 300, 400 or 600 mgm. (base). Parasites disappeared in a little over two days and fever in about one day. No difference was noted between this response and that to standard dosage

(300 or 600 mgm. *once*) of chloroquine base (154 cases). Gametocytes were not affected. In a single instance a mosquito was infected after feeding on a patient under treatment.

The response of acute *P. vivax* cases (54 cases) was equally good and again the results were identical with those obtained with chloroquine (62 cases). Gametocytes disappeared at the same time as the asexual parasites.

In a few cases of *P. falciparum* malaria a full course of 400 mgm. amodiaquine (base) was given successfully with responses similar to those obtained with chloroquine.

The authors recommend a single dose of 600 mgm. (base) as a standard course for adults and for children they recommend: 0-1 year, $\frac{1}{4}$ adult dose; 2-4 years, $\frac{3}{8}$ adult dose; 4-6 years, $\frac{1}{2}$ adult dose; 7-12 years, $\frac{3}{4}$ adult dose; over 12, adult dose.

[This paper is written with the clarity expected from this group of workers. The reviewer is in full sympathy with their footnote: "In happy contrast with other synthetic antimalaria drugs, only the base content of the tablet is mentioned on the bottle, and/or in the manufacturer's pamphlets".]

B. G. Maegraith

EDESON, J. F. B., TURNER, L. H. & LAING, A. B. G. **Studies on the Chemotherapy of Malaria. V. The Suppression of Malaria by Amodiaquin (Camoquin).** *Med. J. Malaya.* 1955, June, v. 9, No. 4, 260-64.

Amodiaquine (400 mgm. base) was given once every 2 weeks for 12 months to labourers on a small rubber estate in Negri Sembilan. The parasite rate at the end of the experiment had fallen from 26 to 0 per cent. and the spleen rate from 30 to 11 per cent. Admissions to hospital over the year were only 2 compared with 57 during the previous year.

In a small group of police on the estate, supposed to be taking 100 mgm. proguanil daily, parasite and spleen rates remained about the same over the year.

The authors conclude that 400 mgm. amodiaquine (base) given once every 2 weeks is an efficient suppressive of malaria in Asian adults in Malaya.

B. G. Maegraith

I. LYSENKO, A. J. [In Search of Methods of Radical Chemoprophylaxis and Relapse-Free Cure of Tertian Malaria with Short and Long Incubation Periods. III. Results of the Study of the Therapeutic Properties of the New Antimalarial Preparation "Chinocid" in Experimental Tertian Malaria] *Med. Parasit. & Parasitic Dis.* Moscow. 1955, v. 24, No. 2, 132-7. [In Russian.]

- II. ————— & CHURNOSOVA, A. A. [IV. Experiment on Radical Relapse-Free Treatment with "Chinocid" of Tertian Malaria with Short Incubation Period] *Ibid.*, 137-41, 1 chart. [In Russian.]
- III. ZHUKOVA, T. A., PROKOPENKO, L. L., PASTERNAK, E. A. & ANDREEVA, L. G. [V. Radical Relapse-Free Treatment with "Chinocid" of Tertian Malaria with Long Incubation Period] *Ibid.*, 141-7, 1 chart. [In Russian.]
- IV. LYSENKO, A. J., GOZODOVA, G. E., FASTOVSKAJA, E. I., ZALJNOVA, N. S. & CHURNOSOVA, A. A. [VI. Results of Study on Tolerance to New Antimalarial Preparation "Chinocid"] *Ibid.*, 147-54, 3 charts. [In Russian.]

In these four communications a number of authors, working at the Institute of Malaria and Medical Parasitology in Moscow and at local centres in Asia, report the results of trials on the effect upon benign tertian malaria of a new Soviet antimalarial compound, Chinocid.

I. The first paper deals with the treatment of induced *P. vivax* malaria in patients undergoing malariotherapy. The general characteristics of Chinocid (synthesized in 1952 by STAVROVSKAJA and BRAUDE) are described as follows. It is a derivative of 8-aminoquinoline, prepared and employed in the form of a hydrochloride, containing 78 per cent. of 8-aminoquinoline base and representing a crystalline powder of light yellow colour, odourless and of slightly bitter taste. It is readily soluble in water (1:2), with difficulty in alcohol (1:50), but is insoluble in ether and benzole.

In the trials Chinocid proved to be effective in curing benign tertian malaria with a short incubation period, the total dose being 0.14 gm. or more of 8-aminoquinoline base, administered *per os* in daily doses of 0.02 gm. for 7 days, or 0.03-0.04 for 10-14 days. In order to prevent the occurrence of relapses, two courses of treatment with the hydrochloride are recommended: (1) 0.03 gm. once a day for 10 days, or (2) doses of 0.015-0.02 gm. for 14 days. Owing to the well-defined schizontocidal properties of Chinocid, it can be used for preventive treatment against relapses alone (*i.e.*, not combined with other drugs) even during acute paroxysms.

II. The second paper describes the results of preventive treatment, carried out in Stalinabad [Middle Asia], against relapses in patients suffering from *P. vivax* malaria with a short incubation period. Administration of Chinocid, during the inter-relapse period, in doses of 0.03 gm. or 0.015-0.02 gm. daily for 10 or 14 days, respectively, had a marked effect, shown in the diminution of the percentage of relapses in patients to one-fifth of the incidence in patients treated by the standard method (Acriquine [mepacrine] or Bigumal [proguanil] combined with Plasmo-cide [pamaquin]).

III. The third paper is devoted to the effect of Chinocid in preventing relapses of *P. vivax* malaria with a long incubation period, trials on which

were made in the Altai region [Central Asia]. As the result of administration of the drug in doses of 0.03 gm. daily for 10 days, preceded by a 5-day course of Acriquine and Plasmocide, early relapses occurred only in 0.6 per cent. of the patients, whereas among those who had been treated with Acriquine alone or by the usual method (standard course followed by chemoprophylaxis) 16.4 and 8.6 per cent., respectively, relapsed.

IV. The last paper deals with the tolerance to Chinocid established in tests carried out on 613 persons, about 580 of whom suffered from benign tertian, 15 from malignant tertian, and 3 from quartan malaria, while 8 had fevers of different aetiology and 6 were normal. It was shown that adult persons tolerated well 30 mgm. of Chinocid *per diem*, either administered alone or following a suppressive course with Bigumal or Chloridine. This drug is therefore considered to be suitable for wide application for the treatment of malaria in out-patient departments. The administration of Chinocid sometimes had side-effects, especially cyanosis, as well as dyspepsia, moderate leucocytosis and drug fever. On account of this, when treatment has to be intensified it is preferable to prolong the course rather than increase the daily dose, which should not exceed 30 mgm. of the drug.

C. A. Hoare

CHRONICLE WORLD HEALTH ORGANIZATION. 1955, Feb.-Mar., v. 9, Nos. 2/3, 31-100, 25 figs. [Refs. in footnotes.] **Malaria: a World Problem.** [Special number prepared by E. J. PAMPANA & P. F. RUSSELL.]

This paper first reviews the distribution of malaria, its importance and the means of its control, and then proceeds to a detailed statement of the activities of WHO in stimulating action against malaria, giving appropriate notice to the activities of other international organizations: the International Children's Fund, the Food and Agriculture Organization, U.S.A. Bilateral Assistance, and the Colombo Plan Organization. WHO activity is primarily given as technical aid and takes the form of advisory teams, malaria control teams which may be engaged in either demonstration or pilot projects, the crystallization of expert opinion through the mechanism of the expert committee and regional conferences, the despatch of consultants, the facilitation of training, the coordination of research and the documentation of control in special monographs and by the publication of scientific papers. All of these activities are reviewed in sufficient detail for a fair appraisal of the very extensive work which the organization is carrying out. A brief statement is given concerning 15 of the 30 projects assisted by WHO, often with UNICEF collaboration, in 1953. These schemes are intended as the ferment which will lead to the development of much larger national programmes, in relation to which they are relatively small but each has its particular

significance. The accounts describe the areas chosen for demonstration, with the population, anopheline vectors, previous intensity and epidemiology of malaria, the form of housing, the dose and cycle of insecticide applied and the degree of success achieved. They refer to programmes in Afghanistan, Burma, Cambodia, Taiwan, India, Indonesia, Iraq, Lebanon, Pakistan, Thailand, Viet Nam, the Cameroons, Liberia, the Philippines and Sarawak. There is special interest in the accounts of campaigns in Indonesia where difficulty was encountered possibly owing to resistance of *A. sundaicus* to DDT, in Thailand where nearly total elimination of *A. minimus* was secured, and in Viet Nam where the insecticidal attack was reinforced by the use of drugs. Pilot projects in the Cameroons and Liberia are as yet too young to lead to data on the control of *A. gambiae* malaria, but pilot trials in the the Philippines have shown that the exophilic *A. minimus flavirostris* can be completely controlled by insecticides, and a similar experiment in Sarawak—though still young—indicates that malaria carried by the exophilic *A. leucosphyrus* can also be controlled.

The paper proceeds to an examination of proposals for the elimination of malaria as contrasted with its control, reviewing the burden of perpetual costs and the data on resistance of anophelines which might have a bearing on them. Eradication of the vector is not the recommended goal though it has been achieved in local areas previously infested by *A. darlingi*, *A. m. labranchiae*, *A. sacharovi*, *A. sundaicus* and *A. minimus* [and *A. funestus*]. Elimination of the parasite by sufficiently prolonged interruption of transmission appears possible and has been achieved in some areas. It would require an intensification of malaria control efforts, special training and the development of some new techniques. It seems, however, that "at the present time there are no obvious technical or economic reasons why malaria should not be driven out of the Americas, Europe, Australia, and much of Asia within the next quarter of a century". The situation is not so promising in Africa where, however, the difficulties may be overcome. *G. Macdonald*

RONNEFELDT, F. Das DDT in der Malariabekämpfung. [DDT in Malaria Control] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, June, v. 6, No. 2, 165-75. [21 refs.]

The English summary appended to the paper is as follows:—

"DDT-Control of malaria in several countries and its peculiarities are briefly reviewed. The figures of two surveys before and after four DDT sprayings in a rural area of Colombia show a rapid and conspicuous reduction of malaria, with complete elimination of *Pl. falciparum*. It should, however, not be forgotten that the local vector species (*A. darlingi*, *A. albicans*) were fully susceptible to DDT, while other vectors (like *A. gambiae*) are not. The advisability of studying the habits of regional anopheline vectors before embarking upon a DDT-campaign is

emphasized. Though DDT keeps leading in malaria-control, there are vectors against which BHC seems to deserve preference; the need for suppressive blanket treatment may also have to be considered."

BÉLIOS, G. D. **Recent Course and Current Pattern of Malaria in relation with its Control in Greece.** *Riv. di Malarologia*. 1955, June, v. 34, Nos. 1/3, 1-24, 7 graphs (1 folding). [21 refs.]

Greece initiated its nation-wide malaria control with the synthetic insecticides in 1946; in 1951 it was one of the first countries to discontinue residual spraying of the houses in rural areas and to replace it by epidemiological surveillance [this *Bulletin*, 1954, v. 51, 346]. *A. sacharovi* was found to be resistant to the chlorinated hydrocarbons in its adult stage [*ibid.*, 1953, v. 50, 1007] and later the same applied to *A. maculipennis* and *A. superpictus* [*ibid.*, 1954, v. 51, 1144]; resistance was proved by the appearance of primary malaria infection contracted a few weeks after adequate spraying of the houses. Although chlorinated hydrocarbons had been used both as imagicides and as larvicides, both on the ground and by air application, no evidence of any appreciable degree of resistance has been noted in the aquatic stages of the anophelines, either vectors or non-vectors.

A tabulated summary of malaria control work performed in Greece from 1946 to 1954 is given. During the first 5 years practically all malarious villages amounting to about 5,000 were treated with residual DDT and at a dose of 1.8 gm. per square metre on a single occasion. Scarcity of insecticides in 1951 in the world market plus an obvious improvement in the malaria situation caused a cessation of house-spraying which was replaced by household inspection for the detection of febrile cases; blood smears were taken and therapy instituted if they were positive. In urban areas malaria was controlled by the ground larviciding of breeding areas; the formulation was DDT emulsion applied at the rate of 0.02-0.04 gm. per square metre of breeding area. Initially air spraying was used as a nuisance control measure applied over large swamps or rice fields lying near inhabited areas; with the strengthening of adult anopheline resistance and the necessity for using combined methods of control, air spraying is now considered as a true, though secondary, method of controlling malaria. DDT is applied at the rate of 0.012 gm. per square metre, in the form of a thermal aerosol from Stearman aircraft.

School and infant parasite indices for the years 1946 to 1954 compared with averages for 1933 to 1939 are tabulated. For the pre-war period these indices were 17.23 per cent. and 10 per cent. respectively; in 1954 they were 0.09 and 0.11. In towns of over 5,000 population the specific malaria mortality before the war was 31.25 per 100,000 and in 1954, 0.07.

The maximum effect of insecticides was felt in 1951 but since then there has been a tendency to an increase in the incidence of malaria, an

increase which has been kept within bounds by strenuous and much more complicated control work. In the light of experience the objective of house-spraying in Greece is now considered to be limited to the maintenance of a low level of malaria incidence for as long a time as possible; at the same time the overall cost of the control scheme will be reduced. Cessation of spraying can only be envisaged if transmission of malaria fails to occur for several seasons [this *Bulletin*, 1955, v. 52, 510].

In 1954 the bulk of the infections were due to *Plasmodium vivax*. Quartan malaria is almost at vanishing point. Graphs and tables are given of the percentage age distribution of laboratory proven malaria cases in Greece for the years 1952, 1953, and 1954; a map illustrates the malarial localities in Greece for the period 1952-54.

The 1955 malaria control campaign envisages residual spraying with chlorinated hydrocarbons other than DDT on a rather large scale; in order to overcome anopheline resistance repetition of the spraying must also be provided for, together with a combination of house spraying with other methods of control, e.g., air spray, in critical areas. Some epidemiological surveillance will continue but with better drugs, both for prophylaxis and therapy, and more frequent visits. *R. Ford Tredre*

BRUCE-CHWATT, L. J., ARCHIBALD, H. M., ELLIOTT, R., FITZ-JOHN, R. A. & BALOGUN, I. A. **An Experimental Malaria Control Scheme in Ilaro a Semirural Holoendemic Area of Southern Nigeria. Report on Five Years Results 1949-1953.** *Malaria Service, Dept. Med. Services, Federation of Nigeria. Information Bull. No. 3.* 70 pp., 23 figs. [12 refs.] [? 1955.]

This is an exceptionally well documented account of a set experiment in malaria control lasting 3 years and intended to test the efficacy of imagicidal attack on the common vectors of Africa. The town chosen, Ilaro, has a population of about 12,000; it lies in the coastal belt of Nigeria and is reasonably isolated from other towns or villages in an area of deciduous forest, and having an equable temperature and a moderate rainfall. Malaria was intense, the spleen and parasite rates, respectively, reaching 72 and 78 per cent. in the 3-4-year age-group, and falling to 12 and 13 per cent. in adults. *Plasmodium falciparum* accounted for 90 per cent. of the positive slides, the remainder showing *P. malariae* interspersed with a few *P. ovale*. Transmission was by *Anopheles gambiae* and *A. funestus* in which the pre-control sporozoite rates were, respectively, 5.9 and 4.9 per cent. Imagicidal measures were started in 1950 and continued to the end of 1952; the insecticide used was a BHC suspension applied on a 3-month cycle and at a dosage intended to leave 10 mgm. of gamma isomer per sq. ft. which was increased to 15 mgm. after the sixth application. Malariometric and other data were collected in the year before control, throughout the experiment and in

the year following. The figures quoted below refer to the pre-control year and the last year of actual application, 1952. The death rate showed some decrease from 15·6 to 13·3, while the infant mortality rate showed a marked decrease from 137 to 67. The parasite rate in the 3-4 age-group dropped from 78 to 52 and the spleen rate from 72 to 53, while the daily risk of inoculation as measured by changes in the infant parasite rate decreased from 0·003 to 0·001. The gametocyte rate among infected children was increased, or rather showed a marked prolongation of the initial period of high gametocytaemia. By these criteria the decrease of malaria was moderate only, but by entomological criteria it was much more marked. The average number of *A. gambiae* per room fell from 2·6 to 0·43, while that of *A. funestus* fell from 2·4 to zero, while the sporozoite rate of *A. gambiae* fell from 5 to 0·6 per cent. At the end of the experiment *A. funestus* could not be found breeding in the locality, while *A. gambiae* bred in lesser numbers than before, its continued existence being explained by the out-of-door resting habit which was demonstrated by catching. The combined result of decrease in anopheline numbers and the sporozoite rate was that the average infective density of anophelines fell from 0·23 to 0·003. The prevalence of *Aedes aegypti* was carefully followed, the *Aedes* index fell to about one-tenth of its previous value and did not start to show recovery for a year after cessation of the work. It was demonstrated by test that *Aedes aegypti* did not develop any resistance to the insecticide.

The work was controlled to some extent by chemical assay which showed a reasonable range of distribution of insecticide, and to some extent by bio-assay with *Aedes aegypti* as an index. The latter method showed that the mortality produced by the insecticide fell greatly before the end of the 3-month cycle, and it is clear that the intervals between applications were longer than appropriate to the circumstances. The expenses of the work were calculated and when stripped of the experimental charges they amounted to about 5s. 2d. per head per annum. The authors conclude that malaria was considerably modified but not eliminated; factors militating against success were the influx of infected anophelines from outside the control limits, the unexpected mobility of the African population, and the fact that the dose applied was not effective for 3 months. The authors are, however, optimistic considering that the experiment shows that by modification of technique this type of malaria can be adequately controlled.

[Though this scheme did not secure full control of malaria it made valuable additions to knowledge. Originally the area was holo-endemic; immunity greatly restricted transmission as is shown by the gross discrepancy between the original anopheline infective density, 0·23, and the inoculation rate as seen from infant parasite rates, 0·003. The decrease in anopheline prevalence and longevity was insufficient to bring transmission below the critical level, and was balanced by a loss of immunity as shown by the prolongation of the period of gametocytaemia

among children; in consequence transmission was reduced to only one-third or one-quarter of its previous volume. The final approximation between the anopheline infective density and the inoculation rate, 0.003 and 0.001, shows, however, that in the end immunity was playing only a very small part in restricting transmission which might have been brought to a complete end by a small increase in the efficiency of the technique used.]

G. Macdonald

HOUEL, G. La lutte antipaludique au Maroc. [**Malaria Control in Morocco**] *Maroc. Méd.* 1954, Sept., v. 33, No. 352, 860-72, 2 maps & 1 chart.

Malaria in Morocco is localized to the Atlantic aspects of the Atlas mountains, and is associated with swamps near the sea and springs and watersheds inland. Severe endemicity is rare, and hyperendemic areas are few and strictly localized. During the last 5 years malaria has been greatly reduced by a systematic campaign which the author describes in detail.

Both anti-anopheline and anti-plasmodial chemicals have improved greatly since the war and provide greater efficacy in 3 main branches of antimalarial work: larvicide, imagicide, and chemoprophylaxis.

Drainage had been embarked on before the war, but during the war many of the drains eroded to form perfect anopheline breeding grounds.

The policy of the *Service Antipaludique* is summed up as (i) larvicidal control around large populated areas; (ii) systematic drainage in agricultural areas, with subsequent strict control of drain maintenance; withholding of any drainage scheme until the *Service Antipaludique* is satisfied as to responsibility for upkeep; (iii) strict regulation of dangerous cultivation; (iv) mass chemoprophylaxis in endemic rural areas of low population density; (v) mass treatment during epidemic manifestations. "The *sine qua non* of effective treatment of epidemic malaria is the taking of an effective dose by *all* the population" [abstracter's translation].

The dangerous cultivation is mainly rice, the area of which has increased from 45 hectares to 6,500 hectares in the last 6 years. Permanent water stands from April to September forming perfect breeding grounds for *Anopheles maculipennis sicaulti*. In rice areas, the population is well grouped and a combined larvicidal and imagicidal campaign has been found the most effective.

For chemoprophylaxis weekly doses of 0.3 gm. of either paludrine [proguanil] or nivaquine [chloroquine] are given, but it is found difficult to get regular attendance. For mass treatment a single dose of nivaquine or flavaquine [amodiaquine] of 10 mgm. per kgm. has given good results. [It is not stated whether these doses are in terms of salts or bases.]

The relation of other conditions to malaria is discussed. Famine,

typhus and relapsing fever did not cause exacerbation of malaria, but the author refers to work, apparently unpublished, by GILLET in 1950 who found a relationship between malarial endemicity and tuberculin sensitivity. This, if traceable, should be of considerable interest.

B. B. Waddy

LE RENARD. Les étapes de la lutte antipaludique dans l'armée au Maroc.
[Stages in Malaria Control in the Army in Morocco] *Maroc. Méd.*
1954, Sept., v. 33, No. 352, 873-4.

The author describes briefly the success of an imagicidal campaign, with DDT-kerosene preparations, in freeing French troops in Morocco from *P. vivax* malaria. Chemoprophylaxis with quinacrine [mepacrine] had been ineffective.

B. B. Waddy

WILSON, D. Bagster. **Trials of Residual Insecticides on a Sugar Estate.**
East African Med. J. 1955, Aug., v. 32, No. 8, 315-24.

On this sugar estate in the Arusha district of Tanganyika there is considerable breeding of *Anopheles gambiae* in the flooded sugar fields and to a lesser extent in the adjoining river. The necessary water is obtained by an irrigation system originating in the river the source of which is the neighbouring mountain of Kilimanjaro; the average annual rainfall at 16.7 inches is low and the soil is very permeable. The population of the estate consists of approximately 15 Europeans, 40 Indians and 2,500 Africans. The parasite rate in 1936 was 66.2 per cent. among 275 examined, and at the commencement of the present observations in 1948 it was 41.5 in 200 examined. The estate labour force is drawn from tribes originating from areas where malaria is moderate or slight in endemicity; the assessment of malaria incidence is complicated by the fact that the labourers are on contract and stay on the estate for a period of about 6 months only.

Residual insecticides were applied at 6-month intervals in 1948, 1949 and 1950, quarterly in 1951, and in May, July and November 1952, and in February, June and September 1953; benzene hexachloride (BHC) water-dispersible powder was applied in the following dosages of grammes per square metre for the successive years: 1948 1.8 and 1.8, 1949 1.9 and 1.0, 1950 1.0 and 1.5, 1951 average 1.2, 1952 2.9, 2.1 and 2.1 and in February 1953 2.2; for each of the last 2 applications in 1953 1.8 of DDT water-dispersible powder was applied.

From the tables of anopheline house-catches it is deduced that at the higher dosage of 1.5-2 grammes the catches in treated houses became very nearly the same as those in the untreated camp (control) within a period of about 3 months, after which there was very little evidence of any control at all. At the lower rate of application, 1 gramme per square metre, the loss of effect was evident after not more than 2 months. This

refers to the period 1948-1950 but at the higher dosage of 2 grammes per square metre in 1952 and 1953 house-catches were reduced to nil for nearly 2 months after each treatment and remained at a very low level for 3 months. The last 2 treatments with DDT appear to have had as great an effect on anopheline reduction as a similar dosage of BHC.

It is possible that the generally lower level of anopheline catches since the middle of 1951 may be due to the treatment of the sugar fields with BHC at the time of cultivation, and therefore just before flooding, for the purpose of controlling cane-borer, an agricultural pest.

In camps untreated with insecticide the general parasite rate ranges between 35 and 50 per cent. This was lowered by about 10 per cent. during the overall period of insecticidal treatment with BHC; but it was only during the period 1952-1953 when treatments every 3 months with approximately 2 grammes per square metre were applied that this substantial reduction in the parasite rate was shown. If those examined are arranged in groups of varying length of residence on the estate no apparent difference is seen between those of longer and shorter residence. A more sensitive index of changes in parasitization is the parasite counts but these follow the same pattern as the parasite rates, though it might have been expected that some effect would have been shown in the counts. All these figures are tabulated.

From these observations the author concludes that over this period of several years, although the anopheline population was greatly reduced, there was no appreciable effect on the human parasite indices of malaria and he states that little benefit can be expected from applications of this kind if applied to limited areas.

R. Ford Tredre

BERNARD, P. M. & GOULESQUE, J. L'indice de régression de Sautet dans la lutte antipaludique à Madagascar. [**Sautet's "Regression Index" in the Antimalaria Campaign in Madagascar**] *Méd. Trop.* Marseilles. 1955, Mar.-Apr., v. 15, No. 2, 202-7.

Thanks to an energetic antimalaria campaign, in which the spraying of houses with residual insecticides and systematic chemoprophylaxis have both been employed, there has been a remarkable reduction of malaria endemicity in Madagascar, as evidenced by the fall in spleen rates of children between 2 and 10 years of age. Before 1949 malaria was holo-endemic in 11 districts and hyperendemic in 42. Today malaria is hyperendemic in only one district, meso-endemic in 58 and hypo-endemic in 21. In a country such as Madagascar, however, where, for the time being at any rate, the eradication of all malaria vectors is out of the question, the cessation of all control measures would be hazardous. In estimating the hazards of malaria recrudescence in any area SAUTET's regression index [this *Bulletin*, 1954, v. 51, 343] has proved its value.

This index is $\frac{\text{I.G.} \times 100}{\text{I.P.}} = \text{I.R.}$ (I.G. gametocyte index, I.P. parasite

index). The calculation of this index annually at the same season of the year provides a valuable measure of the success attained and indications for the continuation, or otherwise, of further effort. Difficulties inherent in the estimation of gametocyte indices of *P. vivax* do not arise in Madagascar. *P. falciparum* is responsible for the vast majority of infections.

Norman White

RAJINDAR PAL, SHARMA, M. I. D., KRISHNAMURTHY, B. S. & GABBA, J. L.

Field Studies on the Comparative Effectiveness of D.D.T., B.H.C. and Dieldrin Residual Sprays against Anopheline Mosquitoes. *Indian J. Malariology*. 1955, Mar., v. 9, No. 1, 33-49, 2 maps. [14 refs.]

VISWANATHAN, D. K., BHATIA, S. C. & HALGERI, A. V. **Field Trials on the Relative Efficacy of Different Dosages and Formulations of D.D.T., B.H.C., Combination of D.D.T. and B.H.C. and Dieldrin in Malaria Control in certain Rural Areas in Bombay State.** *Ibid.*, 51-70, 1 map & 11 charts. [11 refs.]

The Malaria Advisory Committee of the Indian Council of Medical Research proposed that the effectiveness of certain new insecticides should be assessed under different conditions in various parts of the country against different vector mosquitoes, and the Director of the Malaria Institute of India was requested to coordinate this work in various States. In pursuance of these recommendations field trials on the comparative effectiveness of DDT, BHC and dieldrin residual sprays against anopheline mosquitoes were carried out in collaboration with the State Malaria Organizations in 4 states of India, namely Punjab, Uttar Pradesh, Delhi and Bombay. These fully documented reports of the field trials should be consulted in the original by malariologists and medical officers of health.

The vector mosquito concerned in all selected areas of experiment was *A. culicifacies*.

Insecticides were applied from double-barrel stirrup pumps to the inner surfaces of the walls of human dwellings and cattle sheds and as much of the low roof as possible; the majority of the houses have thatched roofs and walls of sun-dried mud bricks plastered with a mixture of cow dung and mud.

The following are examples of the schemes involved: (a) Karnal area, Punjab: 9 villages scattered over an area of about 10 square miles, with a population of 7,169, in a water-logged canal-irrigated area; (b) in the Surat district of Bombay state: 260 villages with a population of 120,000 within an area of about 600 square miles.

The data collected included spleen rates, parasite rates, infant parasite rates and weekly catches of mosquitoes in day-time indoor resting places. In addition, window-trap collections were made by Pal *et al.* and mosquito collections were made during the night by Viswanathan *et al.* The former tested the water-dispersible powders of DDT, BHC and dieldrin

in the following dosages per square foot of wall surface: 50 mgm. DDT, 10 mgm., gamma isomer BHC and 6·25, 12·5 and 25 mgm. for dieldrin; for the 10 mgm. dosage of gamma isomer BHC each of 3 products was tested, namely Gammexane P. 520-A manufactured in India and P. 520-B imported and Hexidol 950; a trial was also given to a combination of DDT (25 mgm.) and BHC (5 mgm. gamma isomer). The authors of the second paper tested DDT in wettable powder and emulsion forms at 56 mgm. and at 112 mgm. per square foot; BHC wettable powder gamma isomer 11 mgm. per square foot; mixture of DDT wettable powder and BHC gamma isomer at 28 mgm. and 5·5 mgm. per square foot respectively; dieldrin as a wettable powder in dosages of 14 and of 28 mgm. per square foot.

The results are based on a single application of insecticide except in the Delhi area where DDT and dieldrin were applied twice with an interval of 6 weeks.

In the first paper tables of catches of all anophelines and of the vector *A. culicifacies* are given; the number of the latter collected was very small but there were fair numbers in the controls.

In the Karnal area, between May and November, the spleen and parasite rates showed satisfactory reductions, compared with the control, except in the instance of parasite rates where DDT, Gammexane P 520-A and Hexidol 950 were used. However, in this instance the statistical analysis has shown that the drop in spleen and parasite rates is not significant, and it is inferred that one round of spray in June of any insecticide was not enough to intercept the transmission of malaria during August and September. In the Uttar Pradesh zone an analysis of the spleen and parasite rates taken in May and December showed that both these rates registered an increase in the comparison village as well as in all the sprayed and unsprayed villages. This clearly shows that one round of spray with any of the insecticides in dosages used, given towards the third week of June, is not enough to stop transmission of malaria which in this area commences towards the end of July and reaches its peak somewhere in September or October.

Nevertheless the authors of the first paper quote the following conclusions:

“Dieldrin 12·5 mg., D.D.T. 50 mg., and B.H.C. 10 mg. gamma isomer/sq. ft. have been found to be equally effective. The duration of residual effectiveness was observed to last for about seven to eight weeks.

“Dieldrin applied at the rate of 25 mg./sq. ft. did not show an increase in the duration of residual effectiveness proportionately. Dieldrin 6·25 mg./sq. ft. was ineffective as a residual spray. Previous trials with D.D.T. have also shown that massive dosages of insecticides, when applied on mud plastered walls, do not seem to show proportionate increase in the duration of residual effectiveness.”

The authors of the second paper record their results in a series of graphs which show very clearly the comparative effects of the various

dosages of insecticides on the weekly density (per man-hour) of *A. culicifacies*. When the density of the vector rose above 5 per man-hour and tended to remain at or above this level a second application of insecticide was considered. This occurrence in the instance of DDT varied between the 5th and 11th week according to formulation, on the average somewhat earlier for BHC at the 6th week and not at all for dieldrin over a period of observation of about 30 weeks.

For the spleen and parasite rates a statistically significant reduction is recorded for dieldrin and for DDT at a dose of 112 mgm. per square foot; the reduction in the case of BHC gamma isomer at 11 mgm. per square foot is not significant; in the instance of the combined use of DDT and BHC the reduction in the spleen rate is significant but not so in the case of the parasite rate.

The authors of the second paper conclude:

“(1) A single application of dieldrin in a dosage of 14 mg./sq. ft. applied at the beginning of the season would establish as high degree of successful malaria control as an application of D.D.T. 112 mg./sq. ft. once or twice during the season.

“(2) B.H.C. when applied in a dosage of 11 mg./sq. ft. (gamma isomer) has a residual efficacy of not longer than six weeks.

“(3) Combination of D.D.T. (28 mg./sq. ft.) and B.H.C. (5.5 mg. gamma isomer/sq. ft.) has not shown any advantage over D.D.T. (56 mg./sq. ft.) or B.H.C. (11 mg. gamma isomer/sq. ft.) used singly.”

A study of the hazards of dieldrin application to spray-men or to children living in sprayed houses revealed no apparent toxic manifestations.

R. Ford Tredre

KRUSÉ, C. W. & LESACA, R. M. **Automatic Siphon for the Control of *Anopheles minimus* var. *flavirostris* in the Philippines.** *Amer. J. Hyg.* 1955, May, v. 61, No. 3, 349-61, 5 figs. [17 refs.]

The periodic flushing of streams as a means of controlling the breeding of certain anopheline mosquitoes is well known. Many automatic siphons have been constructed in the Philippines mainly by workers who have pioneered in this effort and who had a quite limited knowledge of hydraulics and related sciences. This paper recounts the field study of 20 siphons in operation; it is a more or less theoretical analysis from which a suggested procedure is deduced for designing an automatic siphon for the particular set of circumstances at the site of construction. To commence with, the Macdonald, Smith and Legwen-Howard types of siphon are briefly described and illustrated. Also discussed are the causes of failures of these flushing devices which are structural, hydraulic and public tampering. The commentary is restricted to the conditions necessary for the control of the larvae of *Anopheles minimus* var. *flavirostris*, which is a true stream breeder in that it breeds in the vegetation at the edge of slow flowing streams, and differs from the pond-breeding

mosquito which invades pools in the course of streams which have ceased to flow. The principal feature of the adequacy of flushing is that it occurs at frequent intervals during the period of peak mosquito production, or that period during which the larval density results in the largest number of adults. This can only be determined by field study of adult population density and not by the traditional method of dipping for larvae. This period is usually some time after the great rains have terminated and before the streams have begun to dry up; it is in reality an interim period between periods of natural methods of control. The discharge characteristics of the proposed automatic siphon must conform to the flushing requirements during this interim period of high mosquito production; the siphon and reservoir must be constructed to provide this particular discharge at the required intervals. For the computation of the formulae the interested reader must refer to the original paper. The suggested procedure for making the design is described in a series of 7 steps; their application is simplified by the tabulation of sample calculations for Macdonald type siphons with a minimum of one flush per day at an inflow of 1 cubic foot per second per square mile of drainage area. [In these days of imagicide techniques of malaria control larvicide flushing is of limited application; the Philippines is a typical example as the use of residual insecticides against the vector mosquito has met with limited success.]

R. Ford Tredre

MONTALVAN C., J. A. Informe de Labores del Servicio Nacional Antimalárico durante el periodo de Julio 1° de 1953 a Junio 30 de 1954. [**Work of the Chilean National Antimalaria Service from July 1st 1953 to June 30th 1954**] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil. 1954, Oct.-Dec., v. 11, No. 4, 127-38, 1 folding chart & numerous pp. of tables.

A previous paper by the author described the antimalaria campaign which was started in Ecuador in 1949 and the results obtained by 1952 [this *Bulletin*, 1954, v. 51, 466]. Chief reliance was placed on DDT residual spraying which had effected a remarkable reduction in malaria prevalence. The present paper brings the story up to date with special reference to the activities of the Service during 1953-54. In spite of the difficulties in obtaining funds sufficient for the carrying out of the full programme malaria has been so reduced as no longer to constitute a serious threat to health, and the few outbreaks that have occurred here and there have been brought promptly under control. Detailed information is given in tabular form of the spraying work carried out during the year and of the cost involved. Tables setting forth the results of blood examinations indicate an insignificant prevalence of malaria in many sectors of the country. Delay in obtaining adequate financial support threatened the prosecution of an effective campaign in 1954-55.

Norman White

FAURE, A. Évolution de l'infection à *Plasmodium berghei* chez la souris dans le midi de la France. [**Course of *Plasmodium berghei* Infection in Mice in Southern France**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 6, 795-802, 1 diagram.

The author records observations on the course of infection of mice with *Plasmodium berghei*, carried out in the course of one year at Marseilles. The strain was maintained by intraperitoneal inoculation of 3 drops of infected blood, and the blood of infected mice was examined daily till the death of the animals. The parasites could be first detected in the blood 3-5 days after inoculation, their numbers rising progressively up to the day of death. However, in mice which survived longer, maximum parasitaemia was attained by the 16th-17th day, after which the number of parasites diminished. Nevertheless, all the infected animals ultimately succumbed to the infection. A comparative study of the course of infection at different times of the year revealed seasonal variations. In the autumn and winter the infection ran a "typical course", lasting on the average 10 days, with an incubation period of 5 days, and an average of 25 per cent. infected erythrocytes. In the spring and summer, the infection was generally typical, but in April, June, August and September its course underwent certain changes, thus the length of the host's survival increased up to 22 days, the incubation period was prolonged to 6-7 days, and parasitaemia reached an average maximum of 65 per cent.

The conclusion from these observations is that the period of survival of the infected mice is directly correlated with the length of the incubation period, *i.e.*, when the parasites make their appearance in the blood rapidly (4-5 days) the host dies soon, but when their appearance is delayed (6-7 days) the host lives longer. Furthermore, the period of survival of the host was correlated with the degree of parasitaemia, which was low in infections of short duration, and high in prolonged ones. In general, the resistance of mice to infection with *P. berghei* was greater in spring and summer than in autumn and winter. C. A. Hoare

DE SMET, R. & FRANKIE, G. Quelques observations sur l'immunité vis-à-vis du *Plasmodium berghei*. [**Observations on Immunity to *P. berghei***] *Ann. Soc. Belge de Méd. Trop.* 1954, Dec. 31, v. 34, No. 6, 881-91.

The authors describe experiments designed to ascertain whether animals which had recovered from infections with *Plasmodium berghei* acquired immunity or premunity against the disease. The experiments were made on the following rodents: 10 *Cricetomys ansorgei* [pouched rat], 4 *Thamnomys surdaster* [tree rat] and 10 white rats. These animals were inoculated with infected blood or sporozoites and, after the infection in them became undetectable by microscopical examination, the absence of parasites was further verified by subinoculation of mice, and in some cases it was also ensured by treatment with pyrimethamine. The immune

response of these animals was tested by challenging them by reinoculations repeated at different phases of the infection.

Detailed protocols are given of all the experiments, the results of which were as follows. In the pouched rat immunity established itself soon after the primary attack, and was evident from about 1 to 9 months after the initial inoculation. In white rats re-inoculations failed to produce an infection in 8 out of 10 cases, resistance to re-infection having established itself on the average $5\frac{1}{2}$ months after the initial inoculation. In the case of these animals immunity was not absolute, since in one of the rats re-inoculation produced a transitory infection; in another this terminated in death, while in some the presence of parasites could be demonstrated by subinoculation of mice. As regards the tree rats [the natural hosts of *P. berghei*], they developed an immunity after the primary attack: re-inoculations made $3\frac{1}{2}$ and 5 months after the initial inoculation failed to produce re-infection in them, and mice subinoculated from them remained negative. In all these experiments similar results were obtained both after sporozoite and blood inoculation, and with homologous and heterologous strains of the parasite.

C. A. Hoare

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—human, animal; American—Chagas's disease and other trypanosome infections. In each form the following order is followed:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

BURSELL, E. **The Polypneustic Lobes of the Tsetse Larva** (*Glossina*, **Diptera**). *Proc. Roy. Soc. Ser. B.* 1955, Sept. 27, v. 144, No. 915, 275–86, 12 figs. (7 on 4 pls.). [14 refs.]

PACKCHANIAN, A. **Chemotherapy of African Sleeping Sickness. I. Chemotherapy of Experimental *Trypanosoma gambiense* Infection in Mice (*Mus musculus*) with Nitrofurazone.** *Amer. J. Trop. Med. & Hyg.* 1955, July, v. 4, No. 4, 705–11.

In these tests mice were inoculated with 0.2 ml. diluted blood of a mouse heavily infected with a virulent strain of *T. gambiense*. Groups of 75 to 200 animals were divided into groups of 10 and treated after trypanosomes had appeared in their blood. Intraperitoneal or oral treatment was started 24 to 72 hours following inoculation. One to four daily injections of drug suspended in aqueous solutions of a cellulose preparation were given. After a lapse of some days treatment was repeated as before and subsequently repeated if necessary, depending on the result of examination of tail blood for trypanosomes. In mice which relapsed after a certain time the infection was allowed to run its natural course. Those

animals which survived for 6 weeks or longer were regarded as cured since all untreated animals died within a week of inoculation. At the maximum total dosage of 600 mgm./kgm. of nitrofurazone given intraperitoneally up to 80 per cent. survival was obtained, and a somewhat greater survival rate resulted when the same dosage was given orally. Three other nitrofurane compounds in maximum total dosage of 300 mgm./kgm. effected cures in up to 50 per cent. of cases. The oral use of nitrofurane in cases of African trypanosomiasis refractory to other drugs is recommended.

J. D. Fulton

DU TOIT, R. **Trypanosomiasis in Zululand and the Control of Tsetse Flies by Chemical Means.** *Onderstepoort J. Vet. Res.* 1954, June, v. 26, No. 3, 317-87, 6 coloured folding maps & 19 figs. [Numerous refs.]

The tsetse flies of Zululand are *Glossina pallidipes*, *G. brevipalpis* and *G. austeni*, the first of these species being the vector of nagana in domestic cattle. Nagana has recurred in devastating outbreaks among the stock of European and African farmers at intervals of 10-12 years, most recently in 1945-46. The history of the outbreaks and the measures adopted to deal with them are described. These epizootics in the animals are associated with peak densities in *G. pallidipes*. Observations in recent years suggest that pupal parasites may be important causes of the rhythmical fluctuations in tsetse fly numbers, a bombyliid fly, *Thyridanthrax brevifacies*, newly discovered, being particularly responsible.

The biology, habits, and habitats of the 3 species of tsetse fly as observed in Zululand are described. As a result of preliminary trials of the effect of DDT sprayed in liquid form from aircraft, it appeared that certain game reserves were primary breeding centres of *G. pallidipes* and that flies elsewhere throughout Zululand were those which had dispersed widely from these breeding centres; in the dispersal areas no breeding took place but the numbers of flies could be such that severe outbreaks of nagana in cattle occurred. Extensive pupal searches in the breeding centres and the dispersal areas confirmed this conclusion based on the preliminary results by aerial spraying of DDT. The breeding areas comprised only about 3 per cent. of the total area of the country infested by *G. pallidipes*. This finding directed policy to aerial spraying of the breeding centres, with certain ancillary measures only under special circumstances. The work done along these lines since late 1945 is reported in some detail, illustrated by maps and graphs, and by photographs of the work in progress. Modifications in aircraft details, and principles to be observed in the use of aeroplanes, singly or in flights of 6, are described carefully. Although Ansons were used extensively for some years preference was finally for Piper Cruisers. These, with a speed of 100 m.p.h. and flown to give a swathe 25 yards in width and a coverage of about 15 acres per minute at a dosage of 2.6 mgm. of gamma

BHC per square yard, were more practical and economical than Ansons. DDT was widely used at first but, latterly, gamma BHC was considered better. It is concluded from the experience gained over several years that, if eradication of *G. pallidipes* is desired, treatment of the breeding areas should be repeated every 3 or 4 weeks for at least 8 months. This certainly applies to conditions as in Zululand.

Between 1945 and 1952, eradication of *G. pallidipes* throughout Zululand was attempted mainly by aircraft spraying in 3 breeding areas, the Mkuzi, Umfolozi, and Hluhluwe game reserves—and a fourth area, referred to as the Magut area.

The *Mkuzi game reserve* was first treated from the air over 30 square miles in December 1945, and January 1946, with DDT in liquid form. Three applications, each requiring 5 to 6 days to complete, brought weekly fly-counts (by Harris trap) down in the reserve from 28 flies to 3–5 flies per trap, a density which persisted for 8 or 9 months. In neighbouring dispersal areas the density persisted high (22 flies per trap) for about 2 months but this changed to a slow decline in numbers until none was caught by traps 8 months after treatment of the reserve had begun. It was this result which initiated the policy of restricting treatments to the reserves. In the period August to November 1946, 8 approximately fortnightly aerial applications of DDT in smoke or thermal aerosol form were next made in the reserve and the total weekly catch was quickly reduced to as few as 3 or 4 flies. Bait cattle were introduced as the Harris traps were considered inefficient at such low densities. The persistence of some flies went on until, in August 1947, treatment from the ground with DDT thermal smoke generators was tried in 3 square miles of the reserve which were particularly productive of fly catches. But this was not fully successful and between January and September 1948, a further and final series of 9 aerial applications was carried out. The last *G. pallidipes* reported was in July 1948, no others being recorded in a graph up to and including October of the same year. Most interesting is the result in the dispersal areas. By November 1946, no flies were taken and none was caught, except an occasional specimen in May and September 1947, during the following 2 years.

The *Magut area*, severely affected in 1945 and 1946 by nagana, was dealt with as an urgent matter. Being rugged country with densely bushed valleys, aerial spraying was supplemented by discriminative clearing of thickets, DDT thermal smoke generators on the ground, and wide-scale dipping of cattle in DDT-dips. Fly counts of 150 per month in early 1947 dropped to *nil* by September 1949. Bait cattle were substituted for Harris traps during the work. Eradication of *G. pallidipes* is not quite claimed; observations may not have continued long enough to rule out the possibility of late survivors since the pupal period in the cold months may be 5 months and adults can survive 6 months. It is doubted if any known method of sampling would reveal extremely low numbers of fly.

In the *Umfolozu game reserve*, operations began in April 1947, with DDT sprayed 5 times from Anson aircraft before August. Ntambanana—a nagana-stricken area south of the reserve—was also treated. By August, *G. pallidipes* had disappeared from Ntambanana and, in the reserve, catches had dropped from about 60 to about one fly per Harris trap per month. Now, bait cattle were brought into use and catches, as expected, increased. Aerial sprayings continued every 3 or 4 weeks throughout the rest of 1947 but only in the summer of 1948 and then with gamma BHC. Servicing difficulties with the Ansons caused erratic treatment schedules in 1949 and 1950 and the withdrawal of this type of aircraft in March 1951. *G. pallidipes* was still caught on bait cattle. Imperfect schedules, difficult hilly terrain in parts, and need, owing to its size, to treat the reserve in sections may account for the persistence of the tsetse. Further applications of gamma BHC by helicopter in rugged terrain and, finally, 10 sprayings with this insecticide from Piper Cruisers between October and May 1952, concluded the effort to reduce catches to nil. An occasional *G. pallidipes* was caught about May of this year when the complex series of treatments stopped. Thus, small numbers of flies persisted for more than 2 years despite considerable efforts to eradicate them and the satisfactory reductions at the beginning of the work in 1947.

The *Hluhluwe game reserve* was quite well isolated by a 2-mile barrier clearing when treatment from aircraft began in 1947. This reserve provided, in the north, habitats suited mainly to *G. brevipalpis*; elsewhere to *G. pallidipes*. In November 1948, simultaneous aerial spraying of the mountainous, forested, northern area by helicopter and the flatter terrain of *G. pallidipes* by fixed-wing planes (Ansons) was organized and fly reductions then became promising, particularly for *G. pallidipes*. Early work with smoke generators and dust applications of DDT from the ground proved less effective than helicopters for rugged, hill country. In this game reserve, a few flies of both species still came to bait cattle as late as July and August 1952, despite aerial sprayings every 3 weeks in the summer months of 1951 and 1952.

It will be realized that in these few game reserves which are the breeding centres of *G. pallidipes* and the origins of the widely dispersed populations of this fly responsible for nagana epizootics in cattle, a few flies persisted after extensive treatments or were thought probably to exist although undetected. Eradication of *G. pallidipes* in Zululand is not actually claimed, although for practical purposes such a state of affairs, up to December 1952, virtually existed. Elimination of *G. brevipalpis* has never been intended, and less so that of *G. austeni*; the elusive nature of the latter would make observations on control effects difficult. Neither, however, is an important vector of nagana in Zululand.

The introductory sections of the paper give details of earlier attempts to control fly and nagana by campaigns against game, 138,529 animals being killed between 1942 and 1950. Game destruction is now

recommended only for localization of wild game in reserves, or parts of them, so as to concentrate fly and fly-breeding (*G. pallidipes*) and reduce the area requiring aerial treatment with insecticides. Other sections give full accounts of insecticide formulations, equipment, and various methods of treatment tried besides the use of aircraft. There is a detailed analysis of costs of the different methods, but excluding capital outlay, general transport, and labour. It is thought, however, that doubling the operational costs would cover these general items giving a figure of under 2 shillings per acre. The actual figure in Zululand is between 9 and 10 shillings per acre but much of the work over the years was exploratory and experimental, involving expenditure which would not now be incurred in the light of the experience gained.

D. S. Bertram

NÁQUIRA, F. & NÁQUIRA, N. Contribución al estudio de la enfermedad de Chagas. Encuesta epidemiológica en el sur del Perú (Provincia de Tarata. Departamento de Tacna). [**Contribution to the Study of Chagas's Disease. Epidemiological Survey in the South of Peru (Province of Tarata. Department of Tacna)**] *Bol. Chileno de Parasit.* 1955, Apr.—June, v. 10, No. 2, 29–31. [12 refs.]

The English summary appended to the paper is as follows:—

“The authors made the preliminary report of an epidemiological survey about Chagas' disease carried out in some localities of Tacna, Province of Tarata, in the South of Perú.

“58 specimens of *Triatoma infestans* were captured, 39 of which were found positive to *Trypanosoma cruzi*.

“109 xenodiagnostics were applied to people and 11 to domestic animals (6 dogs, 1 cat, 4 guinea-pigs). 26 persons and 1 guinea-pig were found infected with *T. cruzi* at the first examination of the intestinal contents of the nymphs. Up to now they have diagnosed 29 human cases of infection with *T. cruzi*.

“In the serological inquiry, the complement fixation test performed in 66 blood samples, was positive in 45 persons, doubtful in 3, anticomplementary in 1 and negative in 17. Kahn's reaction practised in the same samples was positive in 2 cases and negative in the other 64.”

PINO, F., WHITING, C., ALÉE, R. & ROMÁN, J. Una experiencia sanitaria rural. II. Encuesta epidemiológica de Enfermedad de Chagas en el Distrito Sanitario Experimental de Pirque (Provincia de Santiago). [**A Rural Sanitary Experiment. II. Epidemiological Survey of Chagas's Disease in the Pirque District (Santiago Province), Chile**] *Rev. Chilena Hig. y Med. Preventiva.* 1953, July–Dec., v. 15, Nos. 3/4, 65–71.

In the first part of this study, the authors discussed the plan of this experiment and the general sanitation of the district studied [*Bull. Hyg.*,

1953, v. 28, 445]. They now go further into the topographical aspects of the district and the constructional and other features of 673 houses from the point of view of factors favouring the spread of triatomids.

They then show in a number of tables the results of various epidemiological investigations. Of 828 specimens of *Triatoma infestans* captured in houses, 282 were examined for the presence of *Trypanosoma cruzi* and 20.9 per cent. were found to be positive. Xenodiagnosis was carried out on 1,026 dogs and 595 cats and these were respectively positive in 2.3 and 1.3 per cent. of cases.

The Machado-Guerreiro complement-fixation test was carried out with sera from 835 persons and 13.6 per cent. were positive. Out of 2,209 persons examined, xenodiagnosis was positive in 85 (3.8 per cent.).

Household infection was found in 9 of 673 families and in these cases 2 or 3 infected persons were found in the same house.

H. J. O'D. Burke-Gaffney

DALMA, J. & SCHEFFELS, E. L. Investigaciones sobre la acción de la temperatura en cultivos de *Schizotrypanum cruzi*. [**Effect of Temperature on Cultures of *Trypanosoma cruzi***] *An. Inst. Med. Regional. Tucuman*. 1954, Dec., v. 4, No. 1, 61-9, 1 chart. [23 refs.] French summary.

The authors describe experiments carried out with the view to determine the thermal death point of *Trypanosoma cruzi* in culture. The ultimate object of these observations was to ascertain whether the results could be applied for the treatment of Chagas's disease by pyretotherapy, as in the case of malariotherapy of general paresis.

In one set of experiments blood-agar cultures were exposed in water baths to temperatures from 39°C. to 47°C. The lethal death points for the flagellates at these temperatures were as follows: 39°—85 hrs., 40°—18 hrs., 40.5°—17 hrs., 41°—15 hrs., 42°—10 hrs., 43°—1 hr. 55 mins., 44°—50 min., 45°—30 min., 46°—20 min., 47°—15 min. Since it would be risky to expose patients to temperatures of 40–41° for 15–18 hours, the results of these experiments have no practical application.

In a second series of experiments, cultures of *T. cruzi* were immersed in water baths at 40° and 40.5°C. for 3, 2 and 1 hours at intervals of 24 hours, with the following results:

At 40°,	with exposure for 3 hrs. daily, flagellates died in 10 days.
" "	" " " 2 " " " " " 14 "
" "	" " " 1 hr. " " " " " 15 "
At 40.5°,	" " " 3 hrs. " " " " " 6 "
" "	" " " 2 " " " " " 11 "
" "	" " " 1 hr. " " " " " 12 "

In these experiments the thermal death points of *T. cruzi* were within the temperature range tolerated by patients subjected to pyretotherapy, though their viability in the human host might possibly differ from that in artificial culture.

C. A. Hoare

SILVA, I. I. Método de cultivo del *Trypanosoma* (*Schizotrypanum*) *cruzi* para la preparación de antígenos. [**Method of Cultivation of *Trypanosoma cruzi* for Preparation of Antigens**] *An. Inst. Med. Regional. Tucuman.* 1954, Dec., v. 4, No. 1, 71-5. English summary (7 lines).

The author points out that blood-agar media used for the cultivation of *Trypanosoma cruzi* are not suitable for the preparation of antigens of these organisms, owing to the presence of impurities, such as proteins derived from the erythrocytes. A description is given of a medium in which this defect has been eliminated. It is composed of 5 gm. meat extract, 5 gm. sodium chloride, 20 gm. glucose, 10 gm. peptone, 30 gm. agar, and 1 litre tap water, and is prepared as follows: (1) solid phase: the agar is allowed to soak, then it is pressed through a cloth into boiling water, in which the meat extract, salt, glucose and peptone have been previously dissolved, after which the medium is brought up to 1 litre by addition of water, filtered through gauze, the pH is adjusted to 7.2-7.4, and it is distributed in test-tubes or Erlenmeyer flasks, which are autoclaved and cooled; (2) when the solid phase contains no condensation fluid, broth is added; it is made from 25 gm. cow's liver per 100 cc. water, and kept in receptacles containing 5-20 cc. until required; (3) the fluid phase is represented by centrifuged bovine plasma, prepared under sterile conditions.

For the preparation of the complete diphasic medium, the solid component is liquefied by placing the tubes or flasks in a water bath, after which they are cooled to 50°C., and plasma is added in quantities of 2 cc. and 20 cc. per tube and flask, respectively. Finally the medium is allowed to solidify (in the case of test-tubes as slopes). To ensure sterility, the media are heated in a water-bath to 56-60°C. for 3-7 hours during 2 days. After inoculation of the trypanosomes the cultures are incubated at 24-27°C., and subcultures are made every 14-16 days.

C. A. Hoare

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

AMERICAN GEOGRAPHICAL SOC. **World Distribution of Leishmaniasis.** *Atlas of Diseases.* Plate 14 (6 coloured maps on folding pl.). [Numerous refs.] 1954. New York 32: Broadway at 156th Street. [\$1.25 folded; \$1.50 flat.]

The geographical distribution of leishmaniasis in this Plate is represented in 6 maps. The first of these (in Briesemeister's elliptical

projection) shows the population densities and prevailing winds throughout the world; the second, representing an enlarged section of the preceding, shows the general distribution and incidence of the three forms of leishmaniasis (visceral, cutaneous and muco-cutaneous), together with their reservoir hosts and sandfly vectors in the Old and New Worlds, while in the remaining 4 maps the incidence and distribution of these diseases in the Mediterranean area, Portugal, Peru and the Middle East, are plotted on a larger scale, providing more detailed data on their local distribution.

Brief explanatory notes and remarks provide clues to the maps and an elementary account of the diseases in question, with brief epidemiological data. The reverse of this sheet contains references to (1) basic sources from which the information was obtained and (2) a selected bibliography for different countries.

[It is curious that the sandflies are referred to as "Phlebotomes" and the parasites as "germs".]

C. A. Hoare

ADLER, S. & ADLER, Judith. **The Agglutinogenic Properties of Various Stages of the Leishmanias.** [Correspondence.] *Bull. Res. Council. of Israel.* 1955, Mar., v. 4, No. 4, 396-7.

The authors describe observations on the agglutinogenic power of the flagellated and non-flagellated stages in various species of *Leishmania*. Immune sera in rabbits were prepared against *L. tropica*, *L. infantum* (Israel and Kenya strains) and *L. sp.* from an East African lizard, by intravenous inoculation of cultures and—in the case of the human parasites—also of suspensions of LD bodies from spleens of infected animals. Repeated injections of rabbits with a total of 300 to 500 $\times 10^6$ flagellates produced immune sera with a titre of 1 in 500, in the case of the human parasites, and upwards of 1 in 20,000, in the case of the one from lizards. The anti-lizard serum was found to contain agglutinins against *L. infantum*, *L. donovani* (Indian), *L. braziliensis* and *L. tropica*, the titres against the last-named species being the lowest, while those against the Kenya *L. infantum* were the highest.

Since sera prepared with LD bodies showed low titres (1 in 10 to 1 in 50) against the homologous flagellate stage, it is suggested that the slight antigenicity of the aflagellar forms, when injected into rabbits, might be due to absorption and binding by them of antibodies within the host-cells. This view is supported by observations on the leishmania of lizards, which produces aflagellar forms in medium containing 10 per cent. specific immune serum. If these organisms—which must have absorbed antibodies from the serum—are injected into rabbits after having been repeatedly washed, they produce immune sera with titres not exceeding 1 in 20 to 1 in 50. On the other hand, it is possible that the aflagellar forms are much poorer in agglutinogenic antigens than those in the flagellate stage.

C. A. Hoare

JOPLING, W. H. **Long Incubation Period in Kala-Azar.** [Memoranda.] *Brit. Med. J.* 1955, Oct. 22, 1013.

The author, from the Hospital for Tropical Diseases, London, notes the danger that the diagnosis of kala azar may be overlooked in patients with fever and splenomegaly if they have not been in the endemic area for a long period.

To emphasize that danger he quotes cases of (1) a Polish youth who was in Southern Italy for 2 years from 1944. He came to England in October 1946 and developed kala azar in April 1949, that is $2\frac{1}{2}$ years after he had left Italy; (2) an Indian of 23 who left Bombay for England in May 1952 and developed kala azar in England in February 1954, that is $1\frac{3}{4}$ years later.

Details are given of both cases. In the first the formol-gel test was strongly positive and Leishman-Donovan bodies were found in stained films obtained by spleen puncture. In the second case, the formol-gel test was negative, as were stained marrow smears obtained by sternal puncture: but leptomonads were cultured in NNN medium after 15 days' incubation at 22°C.

The author points out that (1) the formol-gel test may be negative in the early stages, (2) spleen and marrow smears may be negative, so that suitable culture methods should also be carried out.

H. J. O'D. Burke-Gaffney

CHINESE MED. J. Peking. 1955, Mar.-Apr., v. 73, No. 2, 91-9. **New China's Achievements in the Treatment and Prevention of Kala-Azar.**

The methods of control of kala azar adopted in China have been mass treatment campaigns and control of sandflies.

For treatment, sodium antimony gluconate, made in China, has been extensively used. This is given either intravenously or intramuscularly; the routine is "one injection daily for 6 consecutive days (100-180 mg./kg. weight)". [This relative dosage must surely refer to the total dose, and even then the daily dose for an adult of 150 lb. works out at over 1 gm. a day at the lowest relative dosage.] With this routine an immediate cure rate of 98 per cent. and an eventual cure rate of 95 per cent. are claimed. The diagnosis was usually made either by Sia's serum-globulin precipitation test or by the aldehyde test, but where both malaria and kala azar existed diagnostic units were sometimes sent out to assist local physicians.

The treatment was carried out by local physicians who were first given a short course of instruction. In one area alone in East China, 3,259 practising physicians took part in the campaign. The work is aided when necessary by special units sent out from headquarters. Over 200,000 persons have been treated in East China between 1950 and 1953.

There has been a steady reduction in the number of cases of kala azar since 1950; in 4 areas the incidence in 1953 was 24.8, 16.5, 12.5 and 9.4 per cent. of that in 1950.

In investigating animal reservoirs, blood-meals of 493 sandflies were examined; 40.6 per cent. were found to be of bovine origin, 22.6 per cent. human, 4.5 per cent. each canine and equine (donkey) and 1.6 per cent. porcine. The remainder could not be determined. In one area, of 11,095 dogs only 11 showed leishmaniae in the bone-marrow smears but in another district (Kansis) 24 out of 8,462 dogs were infected.

The sandfly concerned in transmission in China is *Phlebotomus chinensis*. It has a short season, 4½ months. It is relatively easy to control by insecticide spraying in houses. This was carried out extensively with DDT and Gammexane; the amount per square metre used was 1.2 to 1.5 gm. of the former and 0.1 gm. of the latter. It was very effective in so far as reducing the number of sandflies was concerned; there was complete freedom from sandflies for the current season and sometimes for the following year as well.

L. E. Napier

LADJIMI, R. & LAKHOVA, M. Premier cas de bouton d'Orient dans la banlieue de Tunis. [**First Case of Oriental Sore in the Environs of Tunis**] *Arch. Inst. Pasteur de Tunis*. 1955, Apr., v. 32, No. 2, 331-6, 1 fig.

JELLIFFE, R. S. **Cutaneous Leishmaniasis in Nigeria and the Western Sudan.** *West African Med. J.* 1955, June, v. 4 (n.s.), No. 2, 92-4, 4 coloured figs. on pl. & 1 map.

Oriental sore is considerably more common in Northern Nigeria than British medical literature seems to imply. French medical literature suggests that it is relatively common in French West Africa.

In October and November 1954, 23 patients with oriental sore were seen at the City Hospital, Kano. A parasitological diagnosis was made in "about a third" of the cases. The lesions were usually "multiple, rather symmetrically-situated circular sores on the extensor surfaces of the forearms, less commonly on the legs and face". The ulcers were ½ to 2 inches in diameter, had sloughing and granulating bases and were surrounded by an area of scaly induration. They responded slowly to intravenous tartar emetic and rapidly to 6 per cent. lithium antimony thiomalate, intramuscularly.

A European child, aged 6, had an ulcer behind the ear that was diagnosed clinically as oriental sore; it cleared up with a total of 4 ml. of 6 per cent. lithium antimony thiomalate and applications of a mercury and aluminium chloride ointment in 2 weeks. [In view of the rapid response to unusually small doses of antimony, it is a pity that a parasitological diagnosis was not made in this case, and also in a larger percentage of the other cases.]

Other medical officers have reported cases from Sokoto, Gusau, Katsina, Maiduguri and Azare; the author concludes that oriental sore

is relatively common in Nigeria north of the 10°N. latitude, as well as in French West Africa.

There are 4 coloured photographs of ulcers. L. E. Napier

DUTT, P. K. & MATHUR, M. P. **Treatment of Oriental Sore by Radio-therapy.** *J. Indian Med. Ass.* 1955, May 16, v. 24, No. 16, 620-22.

Forty cases of oriental sore were treated by X-ray. All were diagnosed by the finding of *Leishmania tropica*. There were 26 adults and 14 children in the series of whom 31 gave a history of less than 6 months' duration of the lesions. In 28 patients the lesions were on the face, 1 on the head, 9 on the arm, and 1 each the abdomen and foot. There were 9 different types of lesions; 4 were subcutaneous nodules, 8 dry papular, and 12 ulcerating, the remaining 16 being various other types. [There were apparently solitary lesions in each case; this is a little surprising unless they were selected as such.]

Where the lesions were small and superficial, they were treated "with superficial X-ray using the factors—45 KVP 2 ma, 2.5 mm. Al filter". The dose given was 50-100 γ at weekly intervals, the total course not exceeding 1,000 to 1,200 γ . When they were larger and infiltration was suspected and "when the lesion was situated over considerable soft tissues with good vascular supply a dose of 50-100 γ had been tried, per week, using the following factor—100 KVP, 6 ma, 1 mm. Al filter". A maximum total dosage of 1,500 γ in one course was seldom exceeded.

The lesions were bathed with saline and dressings applied before and after treatment; in those with secondary infection, this was cleared up first. [The authors do not state how.]

The final result of treatment was ascertained in 22 cases; of these there was complete cure in 13 cases, improvement in 5 and no improvement in 4. The ulcer usually started to heal in 2 to 3 weeks and the final result was a soft pliable scar.

The effect of X-rays was evidently indirect since examination of smears during the course of treatment invariably showed *Leishmania tropica*.

L. E. Napier

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

ZARRILLI, M. La linfoadenite mesenterica nel dermatifo. [**Mesenteric Lymphadenitis in Louse-Borne Typhus Fever**] *Acta Med. Italica.* 1955, June, v. 10, No. 6, 158-67, 10 figs. [45 refs.]

A description, illustrated by 10 photomicrographs, is given of the histopathology of the intestinal walls and mesentery in typhus fever.

The chief features are the occurrence of superficial microscopical ulcers of the mucosa associated with the development of submucosal infiltrations and a condition of hyperplasia with exudative infiltration of the lymphatic tissues of the intestine and mesentery.

The essential underlying lesion is a degenerative vasculitis corresponding to that found in the vessels of the skin, brain, heart, and other organs of the body. The findings support the view that louse-borne typhus is a generalized vasculitis caused by *Rickettsia prowazeki*. The "para-umbilical syndrome" described by Henyer, which consists of a bilateral point, painful on pressure, situated above the level of McBurney's point, is regarded as being associated with involvement of the solar plexus in the diffusion of an inflammatory process affecting the vascular and lymphatic elements of the intestinal wall and its mesenteric attachment.

John W. D. Megaw

WATTENBERG, L. W. **Studies on Rickettsial Toxins. III. Histochemical Survey of Selected Tissue Enzymes in Mice receiving Murine Typhus Toxin.** *Amer. J. Path.* 1955, Sept.-Oct., v. 31, No. 5, 875-81. [19 refs.]

"A histochemical survey of the following enzymes was carried out in various tissues of mice injected with lethal doses of murine typhus toxin: succinic, lactic, α -glycerophosphate, and triose phosphate dehydrogenases; peroxidase; alkaline phosphatase; adenosine-5-phosphatase; and myristoylcholine esterase. No effect of the rickettsial toxin on the activity of these enzymes was demonstrated.

"A late and non-specific decrease in the ability of the liver to reduce neotetrazolium chloride anaerobically in the absence of added substrate was observed, but this is considered an indirect and secondary effect of the rickettsial toxin."

[See this *Bulletin*, 1955, v. 52, 890.]

See also p. 112, KAMO *et al.*, **On the Trombiculid Mites in Kyushu.**

PHILIP, C. B. & WHITE, J. S. **Disease Agents recovered Incidental to a Tick Survey of the Mississippi Gulf Coast.** *J. Econom. Entom.* 1955, Aug., v. 48, No. 4, 396-400, 2 charts.

"During an ixodid tick survey extending over nearly 2½ years in Jackson County, Mississippi, one strain of Q fever and eight of 'maculatum disease' agent were recovered in tests of *Amblyomma americanum* and *A. maculatum* taken off domestic livestock or vegetation. Two cases of Rocky Mountain spotted fever occurred in the county during the survey but no strains of this disease agent were recovered from local ticks."

MIGLIARESE MALESANI, S. Piccolo episodio di febbre "Q" a Isola della Scala nel dicembre 1953. [**Small Outbreak of Q Fever at Isola d'Scala, Italy, in December 1953**] *Giorn. di Malattie Infettive e Parassit.* 1955, July, v. 7, No. 7, 341-3.

COMBIESCU, D. & collaborators. Studiul clinic, epidemiologic, serologic și experimental al cazurilor de tifos pulmonar (febra "Q") apărute într-o colectivitate. [**Clinical, Epidemiological, Serological, and Experimental Study of Q Fever on a Collective Farm**] *Studii și Cercetări Inframicrobiol., Microbiol. și Parazitol.* 1954, July-Dec., v. 5, Nos. 3/4, 229-60, 36 figs. French summary.

The authors write from Rumania, and report an outbreak of Q fever which affected 49 persons on a collective farm, mostly males. The French summary states that the outbreak was explosive, and took place at lambing time, when those working with the animals were exposed to infection from sheep which had given birth to lambs or which had aborted. Radiological examination showed the characteristic picture of opacities in the lung, of varying intensity and more or less homogeneous, affecting either one or both lungs at different sites. It was noticed that some persons in whom *Rickettsia burneti* was found in the blood did not show pulmonary signs. Serological examination was positive for Q fever, and guineapigs inoculated with blood from the patients gave the typical Q fever reaction, and their sera were positive to the complement-fixation test. Similarly, guineapigs inoculated with blood from sheep which had aborted gave results typical of Q fever. The source of the infection was undoubtedly the animals which had aborted or had given birth to still-born lambs.

Charles Wilcocks

RIBEIRO DO VALLE, L. A., CASTRO, R. M., BASSOI, O. N. & FERREIRA, J. M. Febre Q em São Paulo. Primeiro caso clínico comprovado por estudos sorológicos. [**Q Fever in São Paulo. The First Clinical Case confirmed by Serological Investigation**] Reprinted from *Rev. Paulista de Med.* 1955, June, v. 46, No. 6, 447-56, 3 figs. [16 refs.] English summary.

A case is described in which the signs and symptoms were consistent with the diagnosis of Q fever. The complement-fixation test with Henzerling antigen was positive at titres rising from 0 on the 12th day of the illness to 1 in 8 on the 25th day and to 1 in 32 on the 32nd and 37th days. Complement-fixation tests on the same days for viruses of the psittacosis-lymphogranuloma-venereum group were also positive but the titres remained constant at 1 in 32 throughout the period. Haemagglutination-inhibition tests with 4 strains of influenza virus were regarded as giving negative results though with 2 of the strains reactions of 1 in 16

were given on the 12th and 37th days and with another strain the titre rose from 1 in 16 on the 12th day to 1 in 32 on the 37th day.

No attempt was made to isolate the rickettsiae; the possibility of their occurrence was not realized till the 25th day of the illness when the signs of infection had subsided.

The clinical features were those of atypical pneumonia; 4 X-ray photographs show the presence of consolidation affecting patches in the lower lobes of both lungs.

The patient had been working for the previous 3 years as stockman on a farm in Mato Grosso in the state of São Paulo. Complement-fixing antibodies have been detected recently in persons and cattle in the state of São Paulo and in cattle in Rio de Janeiro, but this is the first human case in Brazil in which serological evidence of the disease has been found.

John W. D. Megaw

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

TRAPIDO, H. & GALINDO, P. **The Investigation of a Sylvan Yellow Fever Epizootic on the North Coast of Honduras, 1954.** *Amer. J. Trop. Med. & Hyg.* 1955, July, v. 4, No. 4, 665-74, 2 figs. [15 refs.]

Deaths of monkeys were reported in December 1953, near Catacamas in the centre of Honduras and further occurrences of this kind were later reported, and confirmed, in the coastal zone between La Ceiba and Tela. Laboratory investigation of some of the monkeys confirmed yellow fever as the cause of death. No human cases were, however, recognized during or after these events. Investigations were undertaken to determine the vector by intensive catching of mosquitoes coming to bite men in forest canopy, and subsequent inoculation of the frozen specimens, pooled by species or species groups, into mice. Much of the data on mosquitoes is to be published later but facts bearing on the essential issue of transmission are presented and discussed in this paper.

Catches totalling 17,420 mosquitoes were made within the month following the death from yellow fever of a monkey (a howling monkey, *Alouatta*) near La Masica, and within a quarter of a mile of where it had died. This was a swampy, forested site typical of much of the undeveloped parts of the coastal plain and of the kind of environment from which the monkey epizootic was commonly reported. A significant fact was that no epizootic seemed to occur among monkeys in the forests of the mountain slopes behind the plain. About 11,000 of the mosquitoes

were tested in mice for yellow-fever virus but all tests were negative. *Haemagogus equinus*, not satisfactorily proven a natural vector of jungle yellow fever anywhere in central and south America, formed more than 3 per cent. of the 25 different species of mosquito making up the total catch. On the other hand, *H. spegazzinii falco*, a well confirmed natural vector in Colombia, has only been taken in small numbers (in other catches) from mountain rain forest in Honduras, an environment for which there is yet no evidence of deaths from yellow fever among the monkeys. These contrary findings are puzzling. The identity of the vector or vectors in these swampy forests of the coastal strip remains questionable and there are grounds for recommending further studies on the capacity of certain sabethine mosquitoes (*Trichoprosopon magnum* and, particularly, *Sabethes chloropterus*) as vectors of yellow fever. These occurred in the forest canopy at the collecting site in, respectively, large and moderate numbers. The commonest mosquitoes were *Psorophora ferox* and *P. lutzii*, and *Mansonia* spp. were abundant too but, not being specifically arboreal, they are not considered as likely to be important. *Aedes leucoclaenus clarki* is represented by a single female in a catch elsewhere in Honduras and other *Aedes* species are not suspect as vectors in the present studies.

D. S. Bertram

PINTO SEVERO, O. La campaña de erradicación del *Aedes aegypti* en las Américas—su organización, evolución y resultados hasta diciembre de 1954. [*Aedes aegypti* **Eradication Campaign in the Americas; its Organization, Evolution, and Results as of December 1954**] *Bol. Oficina Sanitaria Panamericana*. 1955, Apr., v. 38, No. 4, 378-98, 9 figs., 2 charts & 1 map. English summary.

The origin of this international, continental campaign was a resolution at a Pan-American Sanitary Organization conference in 1947. Various countries of the Americas began the attack on *Aedes aegypti* at various times and, beginning with Paraguay in 1948, they gradually accepted PASB [Pan-American Sanitary Bureau] technical assistance and coordination.

The introduction of DDT allowed several different methods of attack: (i) universal house-spraying; (ii) peri-focal treatment (*i.e.*, spraying of possible breeding receptacles and of wall surfaces in the immediate neighbourhood of breeding foci); (iii) larvicidal treatments. Method (i) is effective, but more expensive than the peri-focal treatment; it is not recommended except in conjunction with antimalarial work. The anti-larval method is cheaper (per treatment) than (ii) but takes much longer to achieve eradication. Therefore the peri-focal method is advocated for attacking *A. aegypti*.

The use of DDT has simplified some aspects of anti-*aegypti* work and eliminated some difficulties (obtaining access to locked-up houses for

regular treatment is less important, owing to the residual action of DDT). On the other hand, the use of DDT does not eliminate the great importance of regular and careful searching for positive foci or adults, the results of which indicate the progress of the campaign. Uniformity in standards of assessment by different countries is very important, especially in regard to claiming eradication. At a conference in Cuba in 1952, it was decided that, since *A. aegypti* eggs can survive for 1 year while the DDT can only be guaranteed for 3 months, eradication should not be claimed until a year of negative records had been achieved.

This paper reproduces data supplied by various countries on the progress of their campaigns up to 1954. Records give the total areas of the countries, the areas initially infested, the areas searched and the original and present numbers of positives. A chart also shows the state of the campaigns in 39 territories of the American continent in December 1954, illustrating the stages as "complete eradication" (3 countries); "campaign terminated" (8 countries); while the other territories (except for 5) had begun work and campaigns were in progress.

The final sections of this paper review the various factors which, in recent years, have intensified the effort and improved the chances of success in the fight against *A. aegypti*. These include the assistance of the Pan-American Sanitary Bureau, and other named international organizations, the decision of the Pan-American Sanitary Conference to attempt eradication of malaria from the Americas, as the use of DDT against anophelines will also destroy *A. aegypti*; and the fact that the recent yellow-fever outbreak in Venezuela and Colombia has drawn attention to the seriousness of the menace of *Aedes aegypti*.

J. R. Busvine

ALDIGHERI, R. L'organisation et les techniques comparées de lutte contre la fièvre jaune dans quelques pays de l'Amérique centrale.

[**Organization and Comparative Measures used in Control of Yellow Fever in Various Central American Countries**] *Rev. d'Hyg. et de Méd. Sociale*. Paris. 1955, v. 3, No. 4, 314-23.

Since 1948 rural yellow fever has made a fresh appearance in some Central American States. The outbreak is of an epidemic-epizootic nature, so severe epizootically that certain primates have almost disappeared from the forests. The first human cases were observed in Panama, whence the epidemic spread *via* the Canal Zone and has affected Costa Rica, Honduras, Nicaragua, El Salvador, Guatemala and Mexico. The objectives of the resultant public health campaign were twofold: (i) to limit cases in rural and forest populations exposed to the vector (*Haemagogus*), (ii) to prevent secondary urban epidemics in the presence of *Aedes aegypti*.

A programme of mass vaccination was the sole measure in rural areas, and a campaign against *A. aegypti* has so far maintained urban freedom

from the disease. The vaccination campaign is briefly described. Two types of vaccine were employed, Dakar (by scarification) and 17 D (by subcutaneous inoculation). The Dakar vaccine, being more easily transportable, was chiefly employed in rural areas, where ground communications often were so bad that vaccine was delivered by helicopter; 17 D was used mainly in urban areas. There was some resistance to vaccination on superstitious grounds, but it is claimed that high proportions of the rural populations of Panama, Costa Rica and Nicaragua were vaccinated. No reference is made to any medical reactions to vaccination.

The anti-*aegypti* measures undertaken in urban areas are described in detail, a point of interest being the employment of sample house examination as a rapid means of surveying an area for the presence of *A. aegypti*. Elimination of this mosquito demands very strict attention to detailed routine, and a different approach in rural and urban areas. In the latter a campaign may be solely directed against *A. aegypti*; in the former, by making full use of the larvicide and imagocide powers of DDT, one can associate anti-anopheline measures with the campaign.

B. B. Waddy

DENGUE AND ALLIED FEVERS

O'CONNOR, J. L., ROWAN, L. C. & LAWRENCE, J. J. **Relationships between the Flying Fox (Genus *Pteropus*) and Arthropod-Borne Fevers of North Queensland.** [Correspondence.] *Nature*. 1955, Sept. 3, v. 176, 472.

In the city of Townsville in North Queensland dengue fever occurred in epidemic form during the months of December 1953 to March 1954, and one of the authors observed a fairly close relationship in season and place with areas in the neighbourhood in which flying foxes (genus *Pteropus*) were in the habit of swarming to feed on fruit trees surrounding the houses of the local residents. Suspicion was aroused that the flying foxes might be serving as reservoirs of infection from which the local *Aedes aegypti* might become infected. In the months of October and November 1954, the blood of 8 *P. gouldi* and 9 *P. scapulatus* was tested for the presence of protective antibodies against dengue fever virus Type I, by mixing the inactivated serum with a virus suspension containing 100 mouse LD 50 and inoculating 6 mice with each sample of serum and virus.

Sera of 3 of the flying foxes protected all 6 of the mice inoculated, and serum of 1 other protected 5 out of 6 inoculated mice so that 4 of the animals were considered to have protective antibodies against the virus. Sera of 7 animals prevented the death of 2-4 of the 6 mice which were

challenged and the results were regarded as inconclusive. Sera of the remaining 6 animals were considered to have no antibody, 5-6 of the challenged mice of each group died.

Although the virus was of the Hawaiian strain, Type I, isolated by Sabin, the results are not interpreted as being conclusive of past infection by that virus.

John W. D. Megaw

RABIES

COOK, E. B. M., STEARNS, Caroline, FEILD, J. & IRONS, J. V. **Report on the Use of Phenolized Rabies Vaccine in Texas from 1949 through 1953.** *Texas Reports on Biol. & Med.* 1955, v. 13, No. 2, 234-50. [15 refs.]

Since 1934 a phenolized Semple-type vaccine has been used throughout Texas for the specific treatment of human beings exposed to the risk of rabies infection. The vaccine, prepared and distributed by the Texas State Department of Health, consists of a 5 per cent. tissue suspension in 0.25 per cent. phenolized physiological salt solution of emulsified brain from rabbits inoculated with fixed-rabies virus; it is preserved with Merthiolate [thiomersal] in a 1 in 10,000 concentration.

During the 1949-1953 period 8,430 persons received vaccine treatment and of that number 3,428 (40.66 per cent.) had been bitten by animals which, on laboratory evidence, had been diagnosed positive for rabies, while in the case of 2,188 (25.96 per cent.) contact with such animals had been so close as to make treatment imperative. The fact that there were no deaths from rabies among the 8,430 persons treated is proof of the efficacy of the vaccine. Sixteen cases of neuromyolytic accidents, however, complicated vaccine treatment—a number representing an incidence of 0.19 per cent. or of 1 in 527 among the 8,430 persons who had received the vaccine. There was one death among the 16 persons so affected.

That rabies constitutes a serious public health and veterinary problem for Texas is shown by the fact that during the 5-year period under review 12 untreated persons died of that disease, that laboratory proof of rabies was obtained in 16 different animal species, and that 6,383 (28.2 per cent.) of the 22,632 animal brains examined were found to be rabid. Despite the apparent increased prevalence of rabies in wild animals, particularly in the fox and skunk, it is of interest to note that the dog and cat are still the chief vectors of the virus to man. Thus of those treated persons who had been exposed to infection from animals diagnosed histopathologically or clinically as rabid, 86.16 per cent. were bitten or contaminated by dogs, 3.0 per cent. by cats and only 0.76 per cent. by foxes and 0.44 per cent. by skunks.

[It is generally accepted that paralytic accidents may occur towards the end of, or after, treatment, with a frequency varying according to the vaccines and methods employed. That wide variations in the incidence of such accidents may occur, however, even when the same type of vaccine (Semple's killed phenolized vaccine) has been used is well illustrated by the following: in Southern India during the 1933-51 period incidence was 13 among 258,038 persons treated, *i.e.*, 1 in 19,080; in Hong Kong between 1949 and 1952 incidence was 17 among 14,119 persons treated, *i.e.*, 1 in 831.]

G. Stuart

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

LAIGRET, J. L'A.C.T.H. dans le traitement du choléra. [**Corticotrophin in the Treatment of Cholera**] *Méd. Trop.* Marseilles. 1954, Nov.-Dec., v. 14, No. 6, 754-7. [10 refs.]

The problem of the treatment of cholera has not been solved satisfactorily. The severe state of collapse is explained on the grounds of intense dehydration and profound toxæmia. There is also loss of chlorides, especially sodium chloride, and an acidosis.

Faced with a medical emergency it is necessary first to control the dehydration and replace the enormous amount of fluid lost by the vomiting and diarrhoea for which continuous intravenous infusions of isotonic and hypotonic saline are given. Isotonic solutions containing bicarbonate and glucose are also given.

To combat this infection sulphonamides are recommended, *e.g.*, sulphaguanidine, but vomiting makes oral treatment difficult and the author has used aureomycin parenterally, 100 mgm. in 24 hours.

Last year 21 severely collapsed patients were treated in this way and there were 12 deaths. The death rate in all the cholera hospitals is somewhat less, 38 per cent.

In view of certain aspects of this clinical picture in cholera, it was thought logical to try corticotrophin and 11 severely ill patients were treated at the height of the epidemic. Of these 3 died within a few hours and one after initial recovery from the attack died a month later of complication; the remaining 7 were cured.

The dosage of corticotrophin used was 75 to 100 mgm. divided over 24 hours; this was sufficient to transform the clinical picture in a spectacular manner. In each case routine saline infusions and other supportive treatment was also given.

L. E. Napier

FRETER, R. **The Fatal Enteric Cholera Infection in the Guinea Pig, achieved by Inhibition of Normal Enteric Flora.** *J. Infect. Dis.* 1955, July-Aug., v. 97, No. 1, 57-65. [20 refs.]

In this paper the author describes the production of a fatal choleraic infection in the guineapig following the intragastric administration of a streptomycin-resistant strain of *Vibrio cholerae*. The infection resembled human cholera in that it was localized to the intestine, was frequently fatal, and that large amounts of fluid were contained in the lumen of the gut.

The observation of SANARELLI [this *Bulletin*, 1922, v. 19, 379] that suckling rabbits could be infected with *V. cholerae* whereas older rabbits were insusceptible suggested that the change in diet on weaning resulted in a change in the intestinal flora and was of importance in determining the resistance of the animals, and that by reducing the normal intestinal flora of the guineapig by starvation, and inhibiting it by streptomycin, a successful and regular infection might be obtained.

The organism used was a streptomycin-resistant strain of *V. cholerae* (C-11) isolated in Calcutta in 1953 from a non-fatal case of cholera. The strain was originally sensitive to 50 μ gm./ml. of streptomycin but by successive passages on veal infusion agar containing increasing amounts of streptomycin its resistance was raised until it tolerated a concentration of 200 mgm./ml. The animals were starved for 4 days but given water *ad lib*. Each animal then received 250 mgm. CaCO_3 in 10 ml. of distilled water by stomach tube. Three hours afterwards the vibrios, grown on veal infusion agar containing 2 mgm./ml. of streptomycin, were administered, also by stomach tube, in 15 ml. of half-strength veal infusion broth, along with 250 mgm. NaHCO_3 and 5 mgm. streptomycin sulphate. Half an hour later 8 mgm. morphine sulphate was injected intraperitoneally. The number of vibrios introduced was estimated by counts on veal infusion agar containing 2 mgm./ml. of streptomycin. Control animals were treated in the same way but the vibrios were omitted. Symptoms developed in 12 to 48 hours depending on the dose. The animals became listless, and paralysis of the hind legs, hypothermia, and tremor developed. Death occurred in 14 to 48 hours. On post-mortem examination the caecum, and often the whole bowel, was filled with 50 to 60 ml. of fluid containing *V. cholerae* in almost pure culture. The heart blood and spleen were sterile. No free fluid was found in the bowel of the control animals. All guineapigs were not equally susceptible to the infection for of two batches of pen-bred animals received from one dealer and tested simultaneously, the LD50 for one batch was 1,000 million vibrios, and for the other it was only 100,000. Whether this was due to a difference in the intestinal flora of the two batches or to some other factor is unknown.

The rôles of endotoxin and mucinase in experimental cholera were investigated by subjecting guineapigs immunized by these agents to the

experimental infection. Two groups each of individual weight were used. One group served as controls while the other was immunized by the intraperitoneal injection at 5-day intervals of 0.5 ml. of a suspension of boiled streptomycin-resistant vibrios containing 6 mgm./ml. dry weight of vibrios, or by a preparation of mucinase derived from the same strain of vibrio. The mucinase preparation, which had a titre of 1 in 128, was injected intraperitoneally in amounts increasing from 0.5 to 2 ml. All the animals were starved for 3 days after the last injection and infected 4 days later. In the first experiments carried out on a relatively insusceptible batch of animals no detectable protection could be demonstrated in the animals given boiled vibrios. In subsequent experiments with a more susceptible batch a 200-fold protection was demonstrated. Similar protection was found in the animals immunized with mucinase. The results of this experiment are given in a table.

The agglutination titre of the sera of 6 animals which survived the smallest dose of vibrios was determined and found to be 1 in 160 in 1, 1 in 80 in 4, and 1 in 40 in 1. The sera of 5 normal guineapigs gave no agglutination at 1 in 20. The fractional inhibition of mucinase, *i.e.*, the ratio of mucinase titre in normal serum to that in tested serum, in 4 survivors of the group immunized by mucinase was 1 to 16 in 2 and 1 to 8 in 2. In the controls it was 1.

The number of viable vibrios in the intestinal contents of animals which died was estimated by counts in veal infusion agar containing 2 mgm./ml. of streptomycin. The results, given in a table, prove that considerable increase in numbers had taken place and that there was no difference between immunized and normal animals in this respect which suggests that once the disease is acquired its course is not affected by immunization.

The effect of endotoxin when given by mouth was also investigated. The vibrios were grown in aerated peptone water, concentrated by centrifugation and resuspended in distilled water to a concentration of 95 mgm./ml. dry weight. The pH of the suspension was adjusted with HCl to pH 3.8 and the suspension incubated at 37°C. for four hours after which the pH was readjusted to 7.0. The suspension was then steamed for 30 minutes. The LD₅₀ of this preparation as tested by intraperitoneal injection of mice was 0.0625 ml. equal to 5.94 mgm. dry weight. A sample was centrifuged and the LD₅₀ of the supernatant was less than 0.0625 showing that most of the toxin at least was soluble. When doses of this endotoxin varying from 300 to 1,200 mgm. dry weight were fed to prepared animals susceptible to the infection no effect was produced. They remained normal and when killed after 48 hours the intestine contained no free fluid. On the other hand intraperitoneal injection of this toxin in doses of 33 to 190 mgm. dry weight was fatal in every case, death being preceded by hypothermia, paralysis of the hind legs and tremor. No free fluid was found in the gut.

The difference between this experimental infection of the guineapig and human cholera lies in the necessity to inhibit the normal intestinal

flora, and intestinal motility of the guineapig. This suggests that human resistance to enteric disease may depend on the inhibitory action of the normal flora, and that the virulence of an organism in the intestine may depend on its power to overgrow the normal flora. Indeed *Staphylococcus aureus* is known to have caused fatal gastro-enteritis in patients treated by antibiotics to which it is insensitive. The experiments on endotoxin are difficult of interpretation and several possibilities are discussed. This is a very interesting paper.

C. C. B. Gilmour

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

BUCCO, G. & CHIEFFI, G. Sulle varietà morfologiche di *Entamoeba histolytica*.—I. Diametro delle cisti. [**Morphological Varieties of *Entamoeba histolytica*. I. Diameters of Cysts**] *Riv. di Parassit.* Rome. 1954, Oct., v. 15, No. 4, 279–84, 2 figs. [12 refs.] English summary (9 lines).

The authors record the results of observations carried out in the course of 5 years, at the University Clinic of Naples, on 69 patients suffering from amoebic colitis. In fresh faecal smears of these patients a total of 3,965 cysts of *Entamoeba histolytica* (about 57 per patient) were measured, while in 29 cases trophozoites (total number = 1,925) were also measured. It was found that the diameters of the cysts varied considerably, and, when plotted, formed a bimodal curve corresponding to two groups: one with diameters below and one above 10 μ . Among the patients examined, 26 (37.7 per cent.) harboured the small cysts, 41 (59.4 per cent.) the larger ones, while in 2 (2.8 per cent.) cysts of both groups were present. The trophozoites were measured in 13 patients passing small cysts, and in 16 with large ones. These measurements revealed a definite correlation between the dimensions of the trophic and encysted forms of the parasite, cysts with a mean diameter of 7.5 μ corresponding to trophozoites measuring 8 μ , while cysts with a mean diameter of 12.4 μ corresponded to amoebae of 14 μ . Nevertheless, the authors do not accept the existence in *E. histolytica* of two distinct races, but regard the small and large variants merely as strains. This conclusion is based (1) on the transformation of the small forms into large ones, which they claim to have observed in cultures, and (2) on the alleged pathogenicity of the small race. The authors propose to deal with these two questions in subsequent publications.

C. A. Hoare

BUCCO, G. & CHIEFFI, G. Sulle varietà morfologiche di *Entamoeba histolytica*. II. Variazione del diametro dei ceppi. [**Morphological Varieties of *Entamoeba histolytica*. II. Variations in the Diameter of Strains**] *Riv. di Parassit.* Rome. 1955, Jan., v. 16, No. 1, 3-6. [10 refs.] English summary.

In a previous paper [above] the authors gave the measurements of cysts of *Entamoeba histolytica* from 69 persons, among whom in 37.7 per cent. of cases they were less than 10 μ in diameter, and in 59.4 per cent. more than 10 μ , while in 2.8 per cent. cysts of both groups were found. In the present paper they discuss the evidence regarding the existence in this amoeba of a small and a large race, and draw attention to the statements of some authors who claim to have observed the transformation of the small race into the large one. They also record the results of cultivation of the faeces from their 69 cases. Out of 41 with the large cysts, 31 cultures were positive; out of 26 harbouring small cysts, cultures were positive in 6 cases, whereas no growth was obtained from 2 with a mixed infection. In numerous subcultures the strains appeared to "breed true", for no appreciable variation in the dimensions of the amoebae was noted, but in one case the trophozoites, which measured 7.9-8.7 μ in diameter when first inoculated, increased to 14-15 μ in the 14th subculture. From this exceptional occurrence the authors arrive at the conclusion "that the diameter of the strains of *E. h.* is a variable character and, therefore, it cannot be considered a distinctive character for any racial differentiation". [Apart from the fact that most of their own observations actually support the existence of two distinct races, the authors apparently make no distinction between trophozoites of the small ("*hartmanni*") race and the "*minuta*" forms of the large race of *E. histolytica*.]

C. A. Hoare

PAN, C. T. & GEIMAN, Q. M. **Comparative Studies of Intestinal Amebae.**

I. Distributions and Cyclic Changes of the Nucleic Acids in *Entamoeba histolytica* and *Entamoeba coli*. *Amer. J. Hyg.* 1955, July, v. 62, No. 1, 66-79, 15 figs. on 2 pls. & 1 text fig. [Numerous refs.]

The authors have made these studies on the nucleic acids of *Entamoeba histolytica* and *E. coli* so that their distribution may be used as an aid in differentiating the two species, which is frequently difficult on morphological grounds alone. Both parasites were maintained in culture with a mixed bacterial flora. Cover-slip preparations were made by the method of DOBELL [this *Bulletin*, 1943, v. 40, 52] for study of cultures of different ages. The presence of DNA (desoxyribosenucleic acid) was shown by staining with leuco-fuchsin after hydrolysis by HCl for specific times and counterstaining with fast green FCF. RNA (ribosenucleic

acid) was demonstrated by conventional methods, that in controls being removed by perchloric acid or enzymatically. The cytological stain used was Mallory's phosphotungstic acid haematoxylin as modified by Dobell (*loc. cit.*) or Heidenhain's iron-alum-haematoxylin method.

Feulgen staining for DNA in the nuclei of *E. histolytica* trophozoites was positive only to the extent of about 30 per cent. When positive the indications were that division was taking place or was about to take place, and characteristic staining reactions appear to occur during the different phases of this process. The DNA was observed only in 1- or 2-nucleated cysts, never in 4-nucleated forms. In trophozoites of *E. coli*, on the other hand, DNA was nearly always demonstrable and at all stages of nuclear division. In the cystic forms of *E. coli* also Feulgen staining was nearly always positive. With the toluidine-blue-methyl-green technique for RNA detection it was found that basophilia was apparently connected with the presence of this substance. It was demonstrated with equal ease in both species of amoeba, being present alike in cytoplasm and nucleus or both and appeared to be similarly distributed. The strong basophilia of the chromatoid bodies of cystic forms of both species was easily removed by ribonuclease or perchloric acid and these bodies thereafter remained unstained with toluidine blue. They are not stained by the Feulgen method or with methyl green. The chromatin granules in mature cystic nuclei in both types of amoebae were characterized by weak basophilia. The presence of RNA in the nuclei of both species distinguishes them from metazoan cell nuclei.

J. D. Fulton

HARA, K., SAWADA, T., OKA, S. & TAKAGI, K. **The Relationship between Cytoplasmic Basophilia and the Nucleic Acid Content of *Entamoeba histolytica*.** *Gunma J. Med. Sci.* Maebashi. 1955, Apr., v. 4, No. 1, 67-78, 4 figs. [27 refs.]

The authors have attempted to define the source of cytoplasmic basophilia in *E. histolytica* as well as the relationship between the Gram stain and ribosenucleic acid (RNA). The manner in which the amount of this substance is affected during growth has been considered. Since the staining character of tissues depends so much on the techniques employed and is markedly affected by pH, a regular routine, which is fully described, was followed during the staining of amoebae. From the fact that *E. histolytica* retained affinity for basic dyes at pH 2.5 the authors concluded that the property of cytoplasmic basophilia is of real significance. From other experimental work it was concluded that the presence of RNA confers this property. PAN and GELMAN [above] came to the same conclusion. The close relationship of RNA to positive Gram staining of *E. histolytica* was also demonstrated. The maximum content of desoxyribosenucleic acid (DNA) and RNA was found to be associated with great cellular activity of *E. histolytica*.

J. D. Fulton

BUONOMINI, G., DE BLASI, R. & RICCIARDI, M. L. Studi sulla biologia di *E. histolytica*. I. Osservazioni e rilievi sulla coltivazione di stipiti autoctoni. [**Studies on the Biology of *E. histolytica*. I. Observations and Discussion on Cultivation of Autochthonous Strains**] *Riv. di Parassit.* Rome. 1954, Oct., v. 15, No. 4, 285-304. [Numerous refs.] English summary (5 lines).

The first part of this paper is devoted to a historical review of the methods of cultivation of *Entamoeba histolytica*. In the original part, the authors describe their own observations and experiments, the object of which was to determine the species of bacteria promoting the cultivation of this amoeba, and to study other conditions under which their growth takes place. For this purpose a modification of Boeck-Drbohlav's diphasic medium was used chiefly, with subcultures every 48-72 hours.

Abundant growth of *E. histolytica* in culture was obtained in 2 strains isolated from the stools of patients, in which the accompanying bacteria were *Bact. coli* and *Pseudomonas pyocyanea*. Since the latter species "swamped" the former, the successful isolation and maintenance of the cultures was attributed to the presence of *Pseudomonas*. This effect was confirmed in the case of a strain from an amoebic carrier, whose stools contained only an unidentified anaerobe. Growth of this strain of *E. histolytica* was poor until *Pseudomonas* was inoculated into the culture, after which abundant growth was obtained. In contrast to these results, no development, or only poor growth, of *E. histolytica* was observed in cultures of strains in which *Bact. coli* was the predominant organism.

It is concluded that *Pseudomonas pyocyanea* promotes the growth of *E. histolytica*, whereas *Bact. coli* inhibits it. C. A. Hoare

SAUNDERS, S. J. **Case Report: Amoebic Ulceration of the Buttock.** *South African Med. J.* 1955, Aug. 6, v. 29, No. 32, 741-2, 2 figs.

A destitute 29-year-old African woman entered hospital with a large ulcer of the left buttock of 2 or 3 months' duration. Conventional treatment, including the use of penicillin and aureomycin, failed to clear it so she was readmitted to hospital some 2 months later; a history suggestive of amoebic dysentery was then disclosed. No proof of an intestinal *Entamoeba histolytica* was forthcoming on stool examination, but a clinical diagnosis of cutaneous amoebiasis was made; this was confirmed on biopsy. Under appropriate specific treatment with emetine and other drugs the condition rapidly healed. [Amoebiasis should always be treated with emetine, with or without antibiotics, and never with antibiotics alone.] A. R. D. Adams

SMITH, Alice, KIDD, F. H. & HARSHBARGER, Marjorie. **Amebic Abscess of the Liver in an Infant.** *J. Pediatrics*. St. Louis. 1955, Aug., v. 47, No. 2, 234-6, 1 fig.

"A case of acute amebic abscess of the liver with associated pneumonitis and intestinal amebiasis is presented in a white male infant, aged 17 months."

SHAFEL, A. Z. **The Effect of "Polisinerge" Streptomycin-Polymyxin-Neomycin-Bacitracin Combination in the Treatment of Chronic Intestinal Amoebiasis. Preliminary Report.** *Gaz. Méd. Portuguesa*. 1955, Jan.-Feb., v. 8, No. 1, 69-73.

Polisinerge [supplied by Atral Laboratories, Lisbon], a mixture in capsules of the antibiotics streptomycin, polymyxin, neomycin and bacitracin, has been found to be potent in inhibiting the majority of the intestinal flora. Neomycin, which is closely related to streptomycin and has a synergic effect with it, has been said to exert a direct action on the intestinal protozoa both *in vitro* and *in vivo* [*Bull. Hyg.*, 1950, v. 25, 1293]. Ten patients with acute attacks of long continued amoebic dysentery, which had proved refractory to other amoebicidal treatments, were treated with this compound (Polisinerge). Each capsule contained 100,000 U of polymyxin B sulphate, 150 mgm. of dihydrostreptomycin base, 175 mgm. of neomycin base, and 2,500 U of bacitracin; a capsule was given at 6-hour intervals for 7 or 8 days (a total of 28-30 capsules). Diarrhoea stopped in 2 to 7 days; the stools were freed of parasites in 3 to 6 days; and ulcers previously seen sigmoidoscopically healed within 3 to 6 days; there was relief of symptoms in all cases within 2 to 7 days. Three patients initially had some enlargement and tenderness of the liver, and this cleared in 2 of them as a result of the treatment. There was no relapse of symptoms or signs in any case during a 3-month period of observation, but sigmoidoscopic swabbing within this period showed 3 patients still to be infected with *Entamoeba histolytica*. No toxic side-effects resulted from the treatment, and the liver and kidney function tests remained normal throughout.

A. R. D. Adams

ANDERSON, H. H., NELSON, T. L., CARBONO, C. & DIAZ, J. **Erythromycin Stearate against Systemic Amebiasis in Colombia.** *Amer. J. Trop. Med. & Hyg.* 1955, July, v. 4, No. 4, 693-8.

Continuing their previous studies [this *Bulletin*, 1954, v. 51, 928] the authors have investigated the efficacy of this antibiotic in the treatment of human amoebiasis. Sixty patients in Sevilla, Colombia, were believed to suffer from amoebiasis, though parasites were identified in the stools of only 46 of them. Erythromycin is the first antibiotic studied

which is concentrated in the liver in amounts adequate to influence a systemic amoebic infection. Of the 60 patients 45 were believed, on clinical and laboratory evidence, to suffer from amoebic liver involvement, though no actual liver abscess formation was detected then or thereafter. It was in these patients that the authors were particularly interested. Various liver function tests and other methods of examination were done before and after treatment, and it is chiefly on the changes in these tests after erythromycin treatment that the authors base their conclusions. The general results of a few of the liver tests (cephalin-cholesterol flocculation, icterus index, and prothrombin time) are set out in a table in which also are shown the number of stool-positive patients before and after treatment.

The authors conclude with the following summary:—

“Forty-five of 60 patients having hepatic involvement as a manifestation of systemic amebiasis were subjected to a variety of function tests and to clinical examination. Erythromycin stearate was employed orally in 15 mgm. per kilo doses daily for 10 to 14 days and cleared 14 of 15 patients with hepatic amebiasis; 14 of 19 were cleared by a combination of erythromycin plus fumagillin; while 8 of 11 were cleared with fumagillin alone. Of the 60 patients under study, 46 had demonstrable *E. histolytica* in their stools previous to therapy. Only two patients remained, after re-treatment with erythromycin or chloroquine, who still exhibited an abnormally high cephalin-cholesterol flocculation test; and two others who, though clinically improved, still exhibited hepatomegaly.”

A. R. D. Adams

VILLAREJOS, V. M. **Treatment of Amebiasis with Erythromycin.** *Amer. J. Trop. Med. & Hyg.* 1955, July, v. 4, No. 4, 699-704.

Erythromycin is rapidly absorbed from the intestine; but as it is largely destroyed by gastric juice it must be given in an acid-resisting coating. It rapidly diffuses into the tissues from the blood, and thereafter is excreted chiefly in the urine and faeces. Concentrations in the tissues reach higher levels, and persist there for longer, than in the blood; the liver concentrates the drug, which is excreted in the bile in active form; the concentration in the bile is up to 30 times that in the serum. Erythromycin does not cause changes in the normal intestinal flora, and it is virtually non-toxic.

Enteric-coated tablets of erythromycin were given orally to 98 patients in Bolivia with parasitically proven amoebiasis. Twenty-eight of them had acute manifestations of the infection; while 70 suffered chronic, indefinite, or no symptoms resultant on the infection. The initial dosage in all cases was 800 mgm.; thereafter 200 or 300 mgm. was given every 6 hours or every 8 hours for 5 days (totals of 3.6, 4.6 or 6.5 gm.).

The immediate result in the 70 chronic cases was disappearance of parasites from the stools of 9 of the 10 patients given 3.6 gm., 22 of the

24 given 4.6 gm., and all of the 36 given 6.5 gm.; parasitic relapse occurred in 4, 3 and 1 of these respectively, within an average period of observation of about 3 months. Thus the effect in cases of chronic amoebiasis was highly satisfactory when erythromycin was given in the highest dosage used.

The immediate results in the 28 acute cases, all of them passing dysenteric stools, were spectacular in most cases. The symptoms vanished and parasites usually disappeared from the stools within a very few days, and always by the fifth day, whether the dosage given was a total of 4.6 gm. or of 6.5 gm. Three patients of the 8 on the lower of these dosages relapsed within an average period of two months' observation. Only one patient of the 20 on the higher dosage relapsed; she did so within a week. It seems she had previously had irregular and insufficient erythromycin treatment; this suggests that erythromycin resistance was rapidly developed by her parasites.

Three patients with evidence of amoebic hepatitis were treated with an initial dose of 1 gm. and 1.2 gm. of erythromycin daily for 7 days, with apparently completely satisfactory results. *A. R. D. Adams*

CIAURI, G., MATTEI, F. & MASTRANDREA, G. La sindrome steatorroica nella lambliasi intestinale. [**Steatorrhoea and Intestinal Giardiasis**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1955, Aug., v. 36, No. 8, 439-46. [12 refs.] English summary (9 lines).

The authors refer to previous work of their own in which they showed that subjects who are infected with *Giardia* and are given measured amounts of vitamin A to ingest excrete more, and therefore absorb less, of this vitamin than is the case in normal subjects. The rate of absorption of vitamin A is taken as an index of the absorption of fats.

The present paper is a report of an investigation on 7 subjects of *Giardia* infestation who complained of 3-4 bowel discharges daily with the production of a doughy, glistening, frothy stool of an acid reaction, with a little mucus occasionally. There were large numbers of *Giardia*, in both vegetative and cystic forms, in every case. The state of nutrition was good in all subjects and X-ray examination showed only some acceleration in the passage of the ileal contents.

Each patient was given a measured diet containing about 70 gm. of fat for 5 days, all the stools were collected daily after the second day and a number of determinations were made thereon and are tabulated in this paper under the headings of total weight, dry residue, fats ingested, fatty acids, neutral fats, unsaponifiable fraction, soaps, total fats, Zoia's index [not defined], ratio between fatty acids and neutral fats and the coefficient of absorption according to the formula of BLACK *et al.* [this *Bulletin*, 1947, v. 44, 1085]. The fatty-acids-neutral-fats ratio was found to be above normal and the authors attribute the steatorrhoea to

reduced fat absorption, the latter being due to changes in the intestinal wall, much of which is covered or lined with the bodies of the parasite, and to an accelerated passage through the ileum. *J. Cauchi*

MASTRANDREA, G. La lipemia a digiuno nei soggetti lamblasici. [**Lipæmia in Fasting Subjects with *Giardia* Infestation**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1955, Aug., v. 36, No. 8, 457-63. [20 refs.] English summary.

The author refers to previous work which has shown a reduction of the vitamin A content of the blood, owing to reduced absorption of this vitamin through the intestine, of subjects with *Giardia* infection. He now reports on an investigation in which the fat and cholesterol contents of the blood of 8 patients, who were infected with *Giardia*, were estimated before the subjects had taken any food. In spite of steatorrhoea and a reduced absorption of fat through the bowel, these patients showed no appreciable drop in the fat content of their blood, and Mastrandrea attributes this to the presence of reserves of easily available fat in the patient's body which compensate at once for any diminished intake through the diet. The author adds that all his patients with *Giardia* maintained a very good state of nutrition. *J. Cauchi*

WYSOCKA, F. & WEGNER, Z. [**Observations on the Vitality of *Chilomastix mesnili* in vitro**] *Bull. State Inst. Marine & Trop. Med., Gdańsk, Poland.* 1955, v. 6, 265. [Also fuller version in Polish 255-64, 12 figs. & Russian 264-5.]

The English summary appended to the paper is as follows:—

“In the course of serial examinations of diarrhoea stools there were strains of *Chilomastix mesnili* cultivated from two patients. Further there were carried out experiments upon the influence exerted by penicillin and streptomycin on the growth of *Chilom. mesnili* in culture medium, as well as upon its behaviour *in vitro* under influence of toxic doses of antibiotics. For the experiment as the most advantageous medium, LES was used. There was observed no stimulating influence of penicillin and streptomycin on the growth of *Chilom. mesn.* in media but only a prolongation of life of the protozoa in culture. Under the influence of toxic doses of streptomycin (200 000–400 000 γ ml) there was observed a loss of motion ability of *Chilom. mesn.* and highly deformed contours of the cells.

“Cultures of such deformed protozoa proved to be positive particularly by adding living bacteria to the culture medium. Less positive or entirely negative results were obtained after bacterial filtrates and killed bacteria had been used. Similar results showed experiments with penicillin.

Observations concerning the return to life of the motionless forms of *Chilom. mesn.* contribute in some way to the undefined opinions about other *Flagellatae*, viz. if the loss of motion ability of a protozoon means its death."

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

AMERICAN GEOGRAPHICAL SOC. **World Distribution of Spirochetal Diseases.**

2. Relapsing Fevers (Louse-Borne and Tick-Borne). *Atlas of Diseases.* Plate 16 (1 coloured map on folding pl.). [Numerous refs.] 1955. New York 32: Broadway at 156th Street. [\$1.25.]

This constitutes Plate 16 of a very useful Atlas of Diseases being issued by the American Geographical Society. It attempts to give the recorded distribution of human relapsing fevers up to year 1954, and enables one at a glance to see the present position, and the more obvious gaps in our knowledge.

Edward Hindle

HEISCH, R. B. **Do Spirochaetes have a Negative Phase in Lice?** *Bull. Soc. Path. Exot.* 1955, v. 48, No. 3, 322-5. [12 refs.]

The author recalls previous publications on the behaviour of certain strains of *Spirochaeta recurrentis* in lice [this *Bulletin*, 1912, v. 1, 32]. The spirochaetes generally seem to disappear from the stomach within 24 hours and are not seen again until the 6th to 8th day when they begin to reappear in the haemocoelic fluid. Recently the author has studied strains of *S. duttoni* and *S. microti* in lice which were examined daily after being fed on heavily infected mice, and finds that by careful examination of the haemocoelic fluid spirochaetes can be detected during the so-called negative phase, but there is a marked increase in their numbers between the 6th and 8th day after an infective meal. This is considered to provide evidence of a cycle of development in the lice and it is proposed to call the incubation period, during which spirochaetes are extremely scanty, the pseudonegative phase. Curious granular bodies and spirochaetes were found in the nephrocytes of infected lice, but it has not yet been determined whether these represent a developmental or a destructive process.

Edward Hindle

YAWS AND OTHER TREPONEMATOSES

FLOCH, H. On ne peut distinguer le pian de la syphilis à l'aide de réactions sérologiques basées sur les différences d'intensité de la précipitation au sein de solutions salines de concentrations variées avant et après incubation à différentes températures. [**Failure to Distinguish between Yaws and Syphilis by Serological Tests based on Precipitation in Varying Concentrations of Saline at Different Temperatures**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 1, 90-99, 4 figs.

Yaws cannot be distinguished from syphilis by serological reactions based on intensity of precipitation in the presence of saline of various strengths before and after incubation at different temperatures. The author describes and discusses the Kahn universal reaction and its application to syphilis, yaws, leprosy, tuberculosis, malaria and cancer, most of which diseases show a more or less characteristic pattern. In yaws the pattern is somewhat similar to that in syphilis but in low salt concentrations precipitation is less marked in the former. In order to investigate this problem the sera of 14 cases of yaws and 10 of syphilis were tested; results are set out in 4 figures and 2 tables. In all cases there was increase of precipitation after 24 hours at 4°C., more marked in the strong than in the weak salt concentrations; the yaws picture agreed with that of Kahn, but the syphilis one did not. When the perethynol test of Vernes was employed results in the two diseases were very similar.

The author concludes that in his experience neither type of reaction can distinguish between yaws and syphilis.

T. E. Osmond

LI, Huan-ying & SOEBEKTI, R. **Serological Study of Yaws in Java.** *Bull. World Health Organization.* Geneva. 1955, v. 12, No. 6, 905-43, 12 figs.

This article is a long one and contains a large amount of statistical information; there are 12 figures and 15 tables; four of the figures show in the form of photographs yaws lesions healing after treatment.

The main part of the article is concerned with the mean reagin titre in various forms of yaws before and after treatment; the tests employed were all quantitative and included VDRL and Kline slide and Kolmer complement-fixation tests; in some cases the Kahn test, with beef-heart antigen, was done.

The investigation covered 5,315,982 persons, and 596,485 cases of yaws were diagnosed and treated.

The lesions of yaws were divided into 4 categories; (1) early contagious; (2) plantar and palmar hyperkeratosis; (3) ulcerative; (4) osteo-articular. Hyperkeratosis represented 50 per cent., early contagious plus hyperkeratosis, 23 per cent., early contagious 14 per cent., and ulcerative and osteo-articular 13 per cent. of all forms.

Of the clinically positive cases 4.5 per cent. gave negative reactions (STS); this may be explained by the fact that several diseases such as tropical ulcer, scabies, scrofuloderma, etc., may easily be mistaken for yaws. The highest titres were seen in the early contagious, early contagious plus hyperkeratosis and ulcerative plus osteo-articular forms, followed by the ulcerative, hyperkeratotic and osteo-articular; females tended to show a higher mean titre than males but showed a higher percentage of negativity.

As regards treatment with PAM, three schedules were employed; 2×4 , 2×2 and 1×4 ml. each of 300,000 units per ml. All gave apparently equal results, but serological cure and improvement were highest in early cases. At 12 months patients with early contagious lesions and early contagious plus hyperkeratosis showed the greatest fall in titre, followed by patients aged 2-12 years with hyperkeratosis, patients over 19 with hyperkeratosis, and patients with ulcerative lesions plus osteo-articular in that order. In a resurvey 1 year after treatment, 5-10 per cent. required retreatment; however, it does seem that many patients with late lesions were not cured.

When persons clinically free from yaws were tested it was found that the percentage of sero-positives in household contacts and non-contacts was proportional to the prevalence of yaws in any given area.

The author concludes that sero-positivity is truly associated with yaws and is not a consequence of other non-specific factors. *T. E. Osmond*

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

CHAUSSINAND, R. **La lèpre.**

This book is reviewed on p. 118.

CHAUSSINAND, R. & VIETTE, M., with the technical collaboration of J. D'HÉROUVILLE. Étude de la coloration des bacilles acido-alcoolorésistants par le Noir Soudan. [**Study of the Staining of Acid-fast Bacilli with Sudan Black**] *Ann. Inst. Pasteur.* 1955, Sept., v. 89, No. 3, 280-89.

The authors describe a method of staining acid-fast bacilli with Sudan black in alcoholic solution, and decolorizing with acetone, then contrast-staining with pyronin or safranin. With this method tubercle bacilli

are stained black, leprosy bacilli are not stained at all, rat leprosy bacilli grey, paratubercle bacilli different shades from black to safranin. *Myc. marianum* was stained more or less like the paratubercle bacilli. It is hoped to use this method for classifying acid-fast bacilli.

Ernest Muir

CHATTERJEE, S. N. **The Mechanism of the Neural Signs and Symptoms of Leprosy.** *Internat. J. Leprosy.* New Orleans. 1955, Jan.-Mar., v. 23, No. 1, 1-18, 14 figs. [21 refs.]

Not satisfied with the usual explanations of the causes in leprosy of hypopigmentation, anhidrosis, keratosis, depilation, loss of sensation, paralysis and trophic ulceration, namely that they are due to degeneration of various types of nerves, the author promulgates the hypothesis that most of these are due to diminution of blood supply to the nerves or to the skin and its appendages. Evidence of this is improvement of sensation after engorgement of the skin due to reaction, or to mechanical means such as oil or saline injections, or to passive congestion after tying a binder round the leg or thigh. The temperature of anaesthetic areas was found to be lower than of areas with sensation. It is suggested that diminished blood supply to the nerves may be caused by pressure of a thickened nerve sheath on the vasa nervorum, pressure from cellular infiltration between the nerves fibres on the vasa nervorum, or pathological changes in the blood vessels of the nerve.

Ernest Muir

PEPLER, W. J., KOOLJ, R. & MARSHALL, J. **The Histopathology of Acute Panniculitis Nodosa Leprosa (Erythema Nodosum Leprosum).** *Internat. J. Leprosy.* New Orleans. 1955, Jan.-Mar., v. 23, No. 1, 53-60, 3 figs. on pl. [18 refs.]

The authors object to the use of the term "erythema nodosum" in leprosy because their histological examination of 20 specimens from 19 cases showed a condition different from what is generally described under that term. They base their opinion chiefly on the findings in the subcutis rather than in the dermis, and particularly in the fat lobule. "In early cases the histological picture varies from that of small foci of acute inflammatory-cell infiltration or serous atrophy of fat and small foci of necrosis, to an extensive acute panniculitis with numerous areas of abscess formation." The septa between the fat lobules show much less extensive infiltrate. In contrast with this the classical erythema nodosum is characterized chiefly by changes in these septa, which are enlarged by fibrinous exudate with leucocytes and giant cells, and contain the so-called reticulo-endothelial nodules of Miescher. The authors therefore prefer the name "panniculitis nodosa leprosa" for the reactive condition which occurs in lepromatous leprosy. The histological appearances of the two conditions are illustrated in 3 photomicrographs.

Ernest Muir

Ross, Hilary. **The Blood in Leprosy: Morphology, Chemistry, Immunology. A Review. Part I. Cytology, Blood Groups, and Red Cell Sedimentation.** *Leprosy Briefs.* New York: Leonard Wood Memorial (American Leprosy Foundation). 1955, June, v. 6, No. 6, 21-3. [21 refs.] **Part II. Chemistry.** *Ibid.*, July & Aug., Nos. 7 & 8, 26-8; 29-31. **Part III. Immunology.** *Ibid.*, Aug., Sept., Oct., Nov. & Dec., Nos. 8, 9, 10, 11 & 12, 31-2; 33-6; 37-40; 41-4; 45-7. [Numerous refs.]

FLOCH, H. Sur l'intérêt de l'utilisation de lépromines diluées. [**On the Advantage of using Diluted Lepromins**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 3, 367-71, 1 graph.

The author shows by means of a curve a diminution of about 17 per cent. of positivity by using in the Mitsuda test an antigen diluted 1 in 750 as compared with one diluted 1 in 20, but with a dilution of 1 in 1,000 it was diminished by 40 per cent. On the other hand, with the diluted antigen (1 in 750) he obtained 90 per cent. of positivity in 46 children with tuberculoid leprosy, and 59 per cent. in 58 children with undifferentiated leprosy; whereas with the undiluted he obtained 93 per cent. and 45 per cent. in 43 tuberculoid and 85 undifferentiated respectively [this *Bulletin*, 1952, v. 49, 875; 1950, v. 47, 1095]. With the diluted antigen (1 in 750) there were found 78 per cent. of conversions of negative to positive Mitsuda reactions after intradermal inoculation of BCG, whereas in Brazil 100 per cent. of conversions were obtained with massive oral doses of BCG and testing with undiluted lepromin antigen. The conclusion is to recommend, chiefly with a view to conserving an antigen difficult to obtain, the use of 2 dilutions: one 1 in 150 and the other 1 in 750.

Ernest Muir

FLOCH, H. Il est possible de renforcer la positivité des réactions de Mitsuda pratiquées à l'aide d'antigènes dilués sans perdre la spécificité de leur réponse. [**Is it possible to reinforce the Positivity of Mitsuda Reactions brought about with Dilute Antigens without losing the Specificity of their Response?**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 3, 372-5.

With a Mitsuda antigen of 1 in 750 dilution it was found, upon comparing the results with this alone and those when 2 per cent. of liquid paraffin and 12 per cent. of glycerin were added to the diluted antigen, that of 102 tests 42 were the same, in 9 the supplemented antigen was inferior, and in 51 it was superior to the unsupplemented. In 12 the reaction was negative with both antigens. It is therefore concluded that the effect of the diluted antigen is enhanced by these supplements without the specificity of the reaction disappearing.

Ernest Muir

TISSEUIL, J. Au sujet de l'article de Hervé Floch: "La réaction de Mitsuda rendue positive par une primo-infection tuberculeuse est-elle accompagnée d'une immunité relative anti-lépreuse?" [On an Article of Hervé Floch: Is the Mitsuda Reaction, rendered positive by a Primary Tuberculous Infection, accompanied by Relative Immunity to Leprosy?] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 3, 376-7.

Criticism is made of an article of FLOCH [see this *Bulletin*, 1955, v. 52, 650]. The author questions the validity of conclusions as to relative resistance to leprosy among the Creole and European patients, founded on the proportion of lepromatous cases, which is very slight, and on comparative tuberculin skin tests, in these two communities. He argues that negative tuberculin reactions may be caused by massive leprosy infection in the skin which may hinder diffusion, and asserts that a negative von Pirquet should be supplemented by a Mantoux test, and a negative Mantoux by test vaccine.

Ernest Muir

GUINTO, R. S., DOULL, J. A. & MABALAY, E. B. **Tuberculinization and Reactivity to Lepromin. Association between Lepromin and Tuberculin Reactions in School Children in Cordova and Opon, Cebu, Philippines.** *Internat. J. Leprosy.* New Orleans. 1955, Jan.-Mar., v. 23, No. 1, 32-47. [42 refs.]

The object of this study is to determine to what extent a positive lepromin reaction indicates resistance to leprosy. "To determine what actually occurs, field studies in endemic areas are required, designed to measure attack rates in groups of persons differing in response to lepromin but comparable in other respects."

In 544 children of between 7 and 9 years of age a study was made of association between reactions to tuberculin using first (0.00002 mgm.) and second (0.005 mgm.) strength purified protein derivative (PPD), and early and late reactions to lepromin. With the first PPD strength 14 per cent. were positive, and with the second 71.9 per cent. With the early lepromin reading 4.4 per cent. were positive, and with the late 65.3. In only 24 children was there a 10 mm. or more early lepromin reaction, and all of these had typical late reactions. Of these 24 there were 8 positive to the first strength PPD, and all were positive to the second. The occurrence and intensity of the Mitsuda (late) reaction were positively associated with those of the PPD reaction. This would tend to show that tuberculinization of the population may have been responsible for concurrent acquirement of reactivity to lepromin.

There are, however, disagreements in both directions: 9.5 per cent. negative to PPD (of second strength) were positive to Mitsuda, though in all but 1 of these the Mitsuda reaction was weak, which suggested that it might be well in correlating the 2 reactions to accept only lepromin

reactions stronger than 1+. On the other hand there were 16.2 per cent. positive to PPD but negative to lepromin, and in 63.6 of 88 children with this type of disagreement the reaction to tuberculin was 2+ or more.

The only explanation of these disagreements is that, if the tuberculization hypothesis is true, certain persons can develop tuberculoid lesions when acid-fast bacilli are injected into the skin, but have lost or never possessed hypersensitivity to tuberculin; while in others hypersensitivity is present but the power to localize the bacilli in the skin by forming a tubercle is absent.

The article ends with the statement that until cultures of *Myco. leprae* are available "little progress can be made in the fundamental chemical studies which are essential for the elucidation of the nature of the lepromin reaction".

Ernest Muir

ROLLIER, R., PELBOIS, F. & CHRAIBI, L. Sérologie et test de Nelson dans la lèpre. [Serology and the Nelson Test in Leprosy] *Maroc. Méd.* 1955, May, v. 34, No. 360, 575-6.

The authors take advantage of the fact that in Morocco there are no tropical diseases (other than leprosy) likely to cause serological mistakes, and syphilis is the only treponematous disease. Of 197 leprosy patients submitted to the usual serological tests 90 (45.5 per cent.) were positive or "dissociated," whereas 20 per cent. positives are usual in the general population. Of these 45.5 per cent. the Nelson [treponema immobilization] test gave 20.5 per cent. positive, 1.5 per cent. doubtful, and 23.5 per cent. negative. It was noticed that the false positives were all in lepromatous cases with the exception of 3 which were probably early lepromatous cases. The authors consider that the false positives are associated with increase of gamma globulin, which occurs in lepromatous but not in tuberculoid or indeterminate types of leprosy. It was found that the lower the albumin/globulin ratio the larger the percentage of false positive serological results.

Ernest Muir

DUBOIS, A. La lèpre. Diagnostic et traitement. [Diagnosis and Treatment of Leprosy]

This book is reviewed on p. 119.

BLAAUW, K. H. An Account of Clinical Results of 33 Months of Sulphetrone Treatment in Leprosy. *Med. J. Malaya.* 1955, June, v. 9, No. 4, 292-317, 34 figs.

It is calculated that "there is no endemic focus of leprosy in North Borneo". In the Berhala Leper Colony at Sandakan there are about

55 patients, the number having been reduced from 90 during the Japanese occupation. Sulphetrone treatment orally has been used since 1949, and the details and results of each of 73 patients are tabulated and illustrated. An assessment after about 33 months' treatment shows 5 cures and the hope of 8 further cures in the following year. "The rapidly disappearing lepromatous lesion leaves the problem of the slow bacillary result, which does not allow to hope for a cure in under 3 years of treatment. . . ." Tuberculoid cases do not seem to become lepromatous, and in five-sixths of tuberculoid cases improvement or a stationary phase resulted. [This is important, for in Chinese patients in Malaya it has often been reported that, prior to sulphone treatment, tuberculoid cases often went on to the lepromatous type.] Severe toxic reactions were not infrequent, but could mostly be avoided by careful supervision and judgment of the individual case.

Ernest Muir

FLOCH, H. Essai du largactil associé à la D.D.S. en thérapeutique antilépreuse. [**Test of Combined Largactil and DDS in the Treatment of Leprosy**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 3, 402-4.

Three patients were treated with Largactil (chlorpromazine, *N*-(3'-dimethyl-amino) propyl-3-chlorophenothiazine); the cases were respectively lepromatous, tuberculoid and undifferentiated. The first of these patients received DDS treatment by injections at the same time. Largactil was given by mouth in daily 25 mgm. doses. The tuberculoid patient received 10 daily intramuscular injections of the same dose. He had previously been treated with DDS for 2 years. The third patient was given 12 daily injections while suffering a neural reaction, and the reaction disappeared. This is attributed to the pain-relieving property of the Largactil.

It is considered that the improvement of the first (lepromatous) patient was remarkable, but that without further trial an opinion cannot be expressed as to the actual value of Largactil in leprosy.

Ernest Muir

DAVISON, A. R. **Thiosemicarbazone as an Additive in the Treatment of Leprosy.** *Internat. J. Leprosy.* New Orleans. 1955, Jan.-Mar., v. 23, No. 1, 19-22.

This article describes the difficulties encountered in attempting the trial treatment of 50 patients on thiosemicarbazone (TB-1). In these 50 patients there were 3 deaths from other causes, 3 absconded, and all the 13 Europeans at their own request had to be transferred to combined treatment, including sulphones. The whole project was stopped in April 1954 (after 3½ years' treatment), and would have been stopped sooner had it not been that changes in the morphology of the bacilli encouraged the author to continue. The results in the 6 tuberculoid cases were fairly satisfactory, as all were discharged in the end, but the results were

slower than would have been expected with sulphones. Of the 37 lepromatous patients who continued the treatment, though there was clinical improvement in 3 months to a year, and ulceration of the limbs and larynx healed, only 4 patients became negative; but all of these had been taking sulphones, 3 of them for 6 years and the other for 3 years. It is considered that in lepromatous leprosy the action of thiosemicarbazone is weak, and in combination with sulphones the two drugs appear to be antagonistic.

Ernest Muir

BUKER, R. S. The Value of Leprosy Villages in a Program of Prevention. *Internat. J. Leprosy.* New Orleans. 1955, Jan.-Mar., v. 23, No. 1, 61-8.

The author, writing from his experience in Thailand, advocates the formation of leprosy villages, where patients cultivate their land, choose their own leaders, and, away from the abuse that they are accustomed to in their original homes, lead a happy and normal life. "This kind of relative isolation is satisfactory isolation. It has been impossible, to date, to locate a single case of leprosy which has developed because of contact with one of these village cases by a person who lived outside the village. There probably are such cases, but they certainly are rare." Another advantage claimed is that they are economical, when funds and public opinion are not ready for a more intensive type of work, costing less than one-tenth of larger colonies. It is acknowledged that without proper supervision there is a tendency for people to come from a distance and thus increase the total leprosy population in an area. [In fact the degree and quality of supervision are the essential points. As has been found in India and Africa, gathering together of leprosy patients in one area without adequate supervision tends to increase rather than to control the disease.]

Ernest Muir

LACOUR. An Attempt to control Leprosy by B.C.G. Vaccine in the Loyalty Islands. 15 mimeographed pp. of text & 31 pp. of maps, charts & tables. [12 refs.] 1955. Noumea, New Caledonia: South Pacific Commission.

In the introductory background to this report reference is made to those like CHAUSSINAND and FLOCH who have written in favour of trials of BCG as a possible prophylactic in leprosy, and to those who like TISSEUL consider that it cannot be of any value. The cautious attitude of the WHO expert committee is mentioned and their recommendation that studies on the prophylactic value of BCG vaccine should be undertaken.

The Loyalty Islands were considered particularly suitable for the trial because of the stability and homogeneity of their population, and because

there was already accurate knowledge of leprosy and detailed records of annual case-finding. The total population is 12,612. Leprosy appeared in the islands in 1880 when a teacher returned to Guama (Maré) infected with the disease. In 1899 there were 125 cases on Maré, 60 to 80 on Lifou, and in 1924 there was an index of 5.39 per cent. on Ouvéa. In 1953 the census showed 338 cases on the three islands, and in October 1954 there were 319, and 98 of these patients were considered contagious and were isolated; the remaining 221 were placed under medical supervision in the villages.

The operational work in the present campaign was the lepromin test on the 1st day, recording the lepromin test and doing the tuberculin test on the 21st day, recording the tuberculin test and BCG vaccination (if necessary) on the 25th day. Preliminary BCG vaccination had been contemplated but was abandoned for lack of staff. The BCG vaccine used was dry, frozen BCG from the Pasteur Institute, Paris. It was applied in parallel skin scarifications made through drops of vaccine suspension applied to the forearm. The vaccine had to travel oversea, a 30- to 36-hour trip, in thermos flasks, but was found on culture to show no loss of vitality.

Work was begun on Maré Island and, after a two days' survey, 2,639 of the 3,602 inhabitants were tested with lepromin and 2,611 with tuberculin. Some inhabitants were absent fishing and on other employment; 1,321 were vaccinated with BCG. Similar work was done on the other islands.

The tuberculin, lepromin and other indices are given in tabular form in 11 annexes.

During the next years an attempt will be made to control and maintain tuberculin allergy, study Mitsuda reaction, test those not seen originally and the newly-born, and study carefully all new cases of leprosy through clinical, immunological, and bacteriological procedures. *Ernest Muir*

BLANC, M. & PROST, M., with the assistance of MICHEAL, LEMAIRE, E. KUNA, J. ESSELE & J. M. NKOA. **Clinical and Therapeutic Study of an Antigen prepared with *Mycobacterium marianum*, applied to 457 Leprosy Patients.** *Internat. J. Leprosy*. New Orleans. 1955, Jan.-Mar., v. 23, No. 1, 23-31.

The results obtained in producing 73.3 per cent. of positive Mitsuda reactions with injections of this antigen in 6 months to 1 year [this *Bulletin*, 1954, v. 51, 804], led the authors to apply this treatment to all new cases that came under their care. The present report is on 457 patients, 50 per cent. of whom were at first on sulphones combined with the antigen, though later the sulphones were omitted. The method of administration is to inject 0.1 cc. of the antigen [it is not mentioned whether it is alive or killed by heat] intradermally on the outer side of the left arm once a month for 3 to 6 months, and this is followed by

2 months' rest. A local, focal and general reaction results, with fever and headache for 2 or 3 days. There is burning at the site of injection and a papule which increases up to the 28th day, forming a nodule which may become 2 to 3 cm. in diameter. There is generally a diffuse pruritus with micropapules. The reactions vary in degree, 17.2 per cent. being weak or negative, 71.7 moderate, 8.4 strong, and 2.7 very strong. The results on the condition of the disease are given [but the length of treatment at the time of assessing the results is not made clear]. Of the 457 patients, 10 died of other causes, 19 became worse, 96 remained stationary, 334 improved, and of these last 259 improved markedly or very markedly. [This leaves a discrepancy of 2.] It is concluded that, as in 79.9 per cent. the state of the leprosy and the general condition [no mention is made of bacteriological results] improved, and in 56.4 per cent. this improvement was of considerable degree, and as improvement with the antigen is more rapid and stable (with fewer reactions) than with the sulphones, "its efficacy is comparable to that of the sulfones, the action of which it simulates, and which it can replace advantageously".

Ernest Muir

CHAUSSINAND, R. & VIETTE, M. Peut-on utiliser la vaccination par le "*Mycobacterium marianum*" dans la prophylaxie et la thérapeutique de la lèpre. [Can Vaccination with *Myco. marianum* be used in the Prophylaxis and Treatment of Leprosy?] *Rev. Coloniale de Méd. et Chir.* 1955, Aug. 15-Sept., v. 27, No. 238, 158-62.

Three suspensions of acid-fast bacilli living or killed by heat, *Myco. phlei*, *Myco. marianum*, and BCG, were injected, each into 6 guineapigs. Six weeks after the third injection they were all submitted to the lepromin test. With dead organisms there were 4 reactions with *Myco. marianum*, and 5 with BCG; with living organisms there were 1 and 6 respectively, and the sizes of the nodules produced were considerably larger with BCG. It is therefore considered that this is evidence that BCG is superior to *Myco. marianum* in the prophylaxis of leprosy, especially as the former is ordinarily used alive.

Ernest Muir

LAI, Shang-ho. Experimental Studies on Transmission of Human Leprosy to Monkeys. I. Symptomatic Study. *Internat. J. Leprosy.* New Orleans. 1955, Jan.-Mar., v. 23, No. 1, 48-52, 12 figs. on 2 pls.

Histories are given of 18 Taiwan monkeys (*Macacus cyclopis*) which had been inoculated with leprosy nodule suspension, or implanted with pieces of human leproma subcutaneously. In 7 of these, clinical signs developed in the form of nodules, chiefly at the site but also at a distance, swelling of lymph nodes, and flexion of fingers and toes. After repeated

implantations, bacilli, and occasionally globi, were found in the nodular tumours caused. The article is illustrated with 12 photographs.

Ernest Muir

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—TREMATODES (schistosomes, other flukes); CESTODES (Diphylobothrium, Taenia, Echinococcus, other cestodes); NEMATODES (Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).

ZAKARIA, H. **Further Study on the Ecology of the Intermediate Host of *Schistosoma haematobium*, *Bulinus truncatus* Baylis.** *Bull. Endem. Dis. Baghdad.* 1955, Jan., v. 1, No. 2, 123–55, 4 figs.

This is the second paper by the author concerning the transmission of urinary schistosomiasis in a canal system near Baghdad [see this *Bulletin*, 1955, v. 52, 276]. The vector is referred to as *Bulinus truncatus* and, intentionally, no attempt was made to discriminate between this species and its varieties *B. contortus*, *B. dybowskii* and *B. innesi*, all of which are known to occur in Iraq. The first pages give a detailed description of the canal including its flora, fauna and environmental conditions. The second section deals with the association between the snails and their surroundings. Snail density was estimated by counting the average number of snails of the various species collected by dipping a net 13 inches wide into the canal at intervals of 50 to 60 m. and pushing it along the bottom for about 60 cm. Each dip, therefore, covered about 0.2 sq.m. During a survey in which 150 dips were made, an area of some 30 sq.m. was sampled and a total of 4,000 *Bulinus truncatus* collected. On this finding the 10 km. section of the canal must have contained some 5.3 millions of the species.

The following conclusions were reached regarding the preferences of these snails. *B. truncatus* appeared to be concentrated in the vicinity of willow trees which shaded certain sections of the canal. A lightly shaded environment was preferred to one densely shaded or completely exposed. *Cladophora*, a green alga, was the most attractive of the aquatic plants probably because it liberated oxygen. There was no evidence that the snail was attracted to decaying organic matter of vegetable or animal origin. Predatory beetles, fish or frogs did not appear to have any significant effect on the snails. A temperature of 33°C. was not inimical to *B. truncatus* because annually during the period when the canal water reached this temperature the snail population was at its peak. Water temperatures as low as 8°C. were experienced and though the population decreased in cold weather a small number of snails remained

active in places where food was plentiful. Rapid desiccation caused a high mortality but in canals which were emptied the snails burrowed into the bottom to a depth of 1 to 8 cm. and only succumbed when the mud dried out. Distribution of the snails was not affected by depth or width of the canal or by variations in current between zero and 15 metres per minute.

Sulphation was carried out after closing the canal and copper sulphate was added to produce an initial concentration of about 20 parts per million. This dropped to one part per million in about 2 hours. The pH of the water changed from 7.6 to 5 very soon after sulphation but returned to 7.5 in about 2 hours. Similarly, there was an immediate decrease in carbonates and an increase in chlorides, calcium and sodium. Sulphation effected a reduction of about 95 per cent. in *B. truncatus* numbers. A small proportion survived owing to being on exposed banks or drained sections when the molluscicide was added, or owing to incomplete treatment of the water or to being trodden into the mud by the labourers.

This is a detailed study of the ecology of *Bulinus* which merits the attention of those interested.

T. H. Davey

SCHWETZ, J., BAUMANN, H. & FORT, M. *Planorbis metidjensis* Forbes = *Planorbis corneus metidjensis* Forbes = *Planorbis dufouri* Graells: hôte intermédiaire expérimental de *Schistosoma mansoni*. [*Planorbis metidjensis* (*P. corneus metidjensis*, *P. dufouri*) as an **Experimental Intermediate Host of *Schistosoma mansoni***] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 3, 344-6.

The authors refer to the observations of AMBERSON and SCHWARZ and of Fraga de AZEVEDO and colleagues [this *Bulletin*, 1954, v. 51, 394; 1955, v. 52, 377, 789 bis] on the position of the snail *Planorbis dufouri* [*metidjensis*] known to transmit *Schistosoma haematobium* in southern Portugal. They have obtained specimens of the snail from Lisbon and have succeeded in establishing a complete cycle of *S. mansoni* with it. This form of dual transmission is unusual in African planorbids and the authors speculate on the possibility of other planorbids also transmitting *S. haematobium* as well as *S. mansoni*.

H. J. O'D. Burke-Gaffney

ALVES, W., WOODS, R. W. & GELFAND, M. **The Distribution of *Bilharzia* Ova in the Male Genital Tract.** *Central African J. of Med.* 1955, July, v. 1, No. 4, 166-7.

Autopsies were done on 50 consecutive male patients, between 16 and 50 years old, at Salisbury Native Hospital with a view to determining the incidence of schistosome eggs in various parts of the genital and neighbouring structures. Portions of tissue were digested in 10 per cent. KOH for 24 hours, and the deposit was examined for eggs. Thirty-eight (76 per cent.) of the patients so examined yielded schistosome

eggs; 36 of them had *Schistosoma haematobium* eggs in the bladder. In these 36 subjects eggs were found in the vas deferens in 9, the prostate in 9, the tunica vaginalis in 2, the scrotal skin, pampiniform plexus, or epididymis each in a single instance, and the rectum in 26 cases; in no case were ova found in the testis. Nine subjects had *S. mansoni* bowel infections; eggs were found in the seminal vesicles of 2, and either the testis or the bladder of a single case. The ova of schistosomes, therefore, are much more likely to be deposited in the organs closely adjacent to the bladder (seminal vesicles, prostate and intra-abdominal vas deferens) than those more remote (testis, epididymis and tunica); this observation is reflected in the incidence of the clinical manifestations appropriate to the infestation of each of these organs. [For studies of the female genital tract, see this *Bulletin*, 1949, v. 46, 644.]

A. R. D. Adams

ZAKI, A. A. **A Preliminary Study of the Effect of Intensive Doses of Antimony on the Heart.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, July, v. 49, No. 4, 385-6.

The author has examined the ECG changes in 25 patients treated intensively with Repodral [Fouadin] by HALAWANI [this *Bulletin*, 1948, v. 45, 94]. The changes became evident usually after the third or fourth injection, and were progressive during treatment and for a few days after its cessation. The latter fact caused the author concern, as the patients had by then returned to heavy manual work; under such conditions of life intensive antimony treatment should not be employed.

A. R. D. Adams

GÖNNERT, R. & VOGEL, H. Über die Abhängigkeit des Therapieerfolges von Wirts- und Parasitenstamm bei der experimentellen Schistosomiasis. [**The Relation between the Result of Therapy and the Strain of Parasite and Host in Experimental Schistosomiasis**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, June, v. 6, No. 2, 193-8.

Laboratory investigations were undertaken to throw light on the differences in the effectiveness of Miracil (lucanthone, Nilodin) treatment in the Belgian Congo (good) on the one hand, and in Egypt (unsatisfactory) on the other. For this purpose a strain of *S. mansoni* from Liberia was compared with one from Egypt, the hosts being mice from different races. The action of Miracil was tested by the technique described by KIKUTH and GÖNNERT [this *Bulletin*, 1949, v. 46, 481], i.e., the mice were treated orally 1-6 times and the effect was judged by examination of the faeces and by autopsy. A detailed table is given of the findings. Briefly, the Egyptian strain was more resistant than the Liberian strain: 6 doses of 100 mgm./kgm. killed 97 per cent. of the Liberian but only 10.6 per cent. of the Egyptian parasites. With the

Liberian strain the excretion of eggs ceased permanently or for a long period, while with the Egyptian strain it continued apparently unchanged in many of the mice. The result also depends upon the race of mice. In this work, four laboratory races of mice were used. With two of the races, a higher percentage of schistosomes were killed by given doses of Miracil than was the case with the other two races. The result is also affected by the intensity of the infection, a heavier infection being more difficult to eradicate than a lighter one.

F. Hawking

VARMA, A. K. **Human Schistosomiasis in India.** *J. Indian Med. Ass.* 1955, Aug. 1, v. 25, No. 5, 173-5, 1 fig. [15 refs.]

A review of the literature and discussion.

DE LUCENA, D. T. *Morfologia geral dos moluscos planorbídeos.* [**General Morphology of Planorbids**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1954, July, v. 6, No. 3, 311-25, 14 figs. (5 on pl.).

The English summary appended to the paper is as follows:—

“The paper was prepared to give to the technicians of the Serviço Nacional de Malária a good knowledge of the main points of the morphology of the planorbids, enabling them to follow specialized descriptions, to understand classification keys and particularly to use correct terms when writing or speaking on the subject. This knowledge had already been transmitted to many of such technicians during a course given to them, but the paper is intended to reach the rest of them and to serve at any time, as a text for the restudy of the subject. A general morphology of the mollusc is presented, as well as the characterization of the five classes which form the phylum *Mollusca*, especially what concerns the *Gastropoda*. Under the general head of External Morphology of the Planorbids the author presents the main subdivisions of the gastropods, particularly describing the features of the order *Pulmonata* and the suborder *Basommatophorae*, with the families *Limnaeidae*, *Planorbidae*, *Physidae*, *Ancylidae* and *Bulinidae*. Details are also given on the internal morphology of the planorbids.”

PEREIRA, O. & DESLANDES, N. Resultados de uma tentativa para determinar a idade do *Australorbis glabratus* (Say, 1818). [**Results of an Attempt to Determine the Age of *Australorbis glabratus***] *Rev. Serviço Especial de Saúde Pública.* Rio de Janeiro. 1954, June, v. 6, No. 2, 433-65, 11 pls.

The English summary appended to the paper is as follows:—

“Taking into consideration the results of our experiments as a whole, we see that population density appreciably influenced biological and

morphological variation of snails, during the 60 day observation period, from which we conclude:

" 1. Growth and reproduction rates will be relatively higher, in time and in space, the lower the population density of the water deposit. Logically, the contrary will be true.

" 2. We find no relation between the known age of the snail and the sum of its external morphological characteristics (shell).

" 3. We also noted no coincidence between the age of the snail and the morphology of the internal organs studied.

" 4. The morphological appearance, whether more developed or whether still rudimentary, of the internal organs studied, is directly related to the size (growth) of the shell and this growth (see item 1) is much more subject to environmental influences than the mollusc's age.

" 5. The period of first laying was related not to the age but to the growth of the snail.

" 6. From the systematic point of view, identification of the *A. glabratus* is practicable in species whose shells are at least 5 mm. maximum diameter, regardless of age.

" 7. The basic steps adopted for these investigations did not give the desired results for determining the snail's age from shell characteristics and from the internal anatomy of the *A. glabratus*."

ROMEIRO, L. & AGUIAR, Hilda. A influência do teor em cálcio do criadouro sobre um planorbídeo. Nota prévia. [**Influence of the Calcium Content of the Breeding Place on a Planorbid**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1954, July, v. 6, No. 3, 433-9, 1 fig.

The English summary appended to the paper is as follows:—

" The authors made quantitative chemical analysis on the calcium content of the snail's shell of the species '*Australorbis tenagophilus*' determining the same element also in the water and in the mud of the breeding-places of this mollusc, observing at the same time the density of the snail population.

" Six breeding-places of different character like ditches and lakes were investigated during the dry season, while another six were observed during the rains.

" The results indicate that the chemical composition of the breeding water alone is not sufficient to draw conclusions in relation to the biology of the snails but one has also to consider the composition of the mud."

PAULINI, E. O planorbicida: pentaclorofenol. [**Pentachlorophenol as a Planorbicide**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1954, July, v. 6, No. 3, 333-41. [25 refs.]

The English summary appended to the paper is as follows:—

" The author presents a general review on the pentachlorophenol with

the following aspects; physical and chemical properties; industrial processes of fabrication; preparation on a semi-industrial scale in the Institute of Malariology; analytical methods of determination; biological activity against fungi, plants, insects, snails, vertebrates; methods of application as molluscicide; economical considerations in the application of four molluscicides."

PEREIRA, O. & MENDONÇA, F. Determinação, por análises químicas, do raio de ação do pentaclorofenolato de sódio em Águas Correntes. [**Chemical Determination of the Range of Activity of Sodium Pentachlorophenol in Running Water**] *Rev. Serviço Especial de Saúde Pública*. Rio de Janeiro. 1954, June, v. 6, No. 2, 425-32, 3 graphs (2 folding). [10 refs.]

The English summary appended to the paper is as follows:—

"1. In running water, the main obstacle which prevents sodium pentachlorophenol from maintaining original concentrations over long distances is the fact that it is retained in the soil, probably by adsorption.

"2. The soil retains the toxic for approximately 20 days, intensity of retention (adsorption) varying with the type of soil.

"3. Tar soap associated with sodium pentachlorophenol did not hinder or decrease intensity of retention (adsorption) of the toxic by the soil.

"4. In running water, with a treatment of 10 ppm for 48 hours, the toxic maintained its concentration for a distance of approximately 2,900 meters. At 3,000 meters, concentration decreased to 8 ppm.

"5. Increasing treatment to 60 hours, the toxic's effective range underwent no alteration; at 4,300 meters, maximum distance observed, sodium pentachlorophenol was found at 6 ppm concentration.

"6. The toxic remained in the water in quantities of about 6 ppm for an appreciable length of time and, in view of previous experiments, leads us to believe that lethal effect on the molluscs is sufficient."

CHUNG, Huei-lan, WENG, Hsin-chih & HOU, Tsung-chang. **Immuno-diagnosis and Chemotherapy of Clonorchiasis sinensis with especial reference to Efficacy of Chloroquine including a Note on Negative Effect of Oxychloroquine.** *Chinese Med. J. Peking*. 1955, Jan.-Feb., v. 73, No. 1, 1-14.

A study was made of 9 clonorchiasis patients in a non-endemic area; all were adults and the time of residence away from an endemic area varied from 6 months to 20 years. In most patients there were practically no symptoms; minimal abdominal symptoms occurred in about half the patients, namely vague abdominal pain and diarrhoea. The liver was enlarged in 4 cases, the spleen in none.

Nearly all liver function tests were within normal limits; plasma

proteins were somewhat low, but the ratio was satisfactory. Ova of *Clonorchis sinensis* were found in the stools of all the patients and in one the number passed in 24 hours was as many as 930,000; this patient had been infected for at least 18 years.

The complement-fixation test was performed in 4 cases; the antigen used being a saline extract of adult *Clonorchis*; in 2 it was positive and in 2 negative. *Schistosoma* and *Paragonimus* antigens gave negative results except in one case with the latter antigen.

The intradermal test was done in 8 cases, the antigen used being a 1 in 250 saline extract of which 0.1 ml. was injected intradermally; readings were made after 15 minutes and 24 hours. The results were positive in all 8. Similar antigens from *Fasciola* and *Paragonimus* also gave positive results, but the reaction was less marked. *Schistosoma* antigen gave negative results.

Chloroquine was given to 9 patients, 8 of whom completed the course; in each of these 8 patients the ova disappeared from the stools and the aspirated bile and in the 9th patient the number was much reduced. Such symptoms as there were disappeared. One patient relapsed 2 months later, but in the remainder a follow-up examination 2 to 7 months later showed them still free of symptoms and ova.

The average course of chloroquine base consisted of 10.4 mgm. per kgm. body weight daily for 39 days. The actual total amount given varied from 19.5 to 39.0 grammes and the period from 20 to 53 days. The amount necessary to eliminate the ova from the stools varied from 12.75 to 21.50 grammes, and from the bile 16.0 to 39.0 grammes.

L. E. Napier

CHUNG, Huei-lan, WENG, Hsin-chih, HOU, Tsung-ch'ang & Ho, Lien-yin.

The Value of Complement Fixation Test and Intradermal Test in the Diagnosis of Paragonimiasis. *Chinese Med. J. Peking.* 1955. Jan.-Feb., v. 73, No. 1, 47-54.

A trial of complement-fixation tests with serum and cerebrospinal fluid, and of intradermal tests was carried out with 13 patients suffering from paragonimiasis and in 35 control subjects. The antigen for both tests was made from adult specimens of *Paragonimus westermani* obtained from laboratory-infected cats: it consisted of the clear supernatant fluid from a 1 in 25 emulsion in saline. The complement-fixation tests were performed by the Kolmer Wassermann test "half volume" technique with controls.

The serum test was positive in all 13 cases and the cerebrospinal fluid test was positive in 5 out of 10 cases; in all 5 in which the cerebrospinal fluid was positive there was definite evidence of cerebral involvement.

For the intradermal test a 1 in 250 solution was used; of this 0.1 ml. was injected intradermally with a saline control nearby. Readings were made at short intervals after 5, 10, 15, 30, 60 and 120 minutes and after

24 hours. A positive result was indicated by an immediate weal from 1.0×1.4 cm. to 2.5×4.0 cm. in size with pseudopodia; a surrounding erythema and intense itching followed. The maximum was usually observed in 15 minutes; the reaction subsided within 2 hours, but in a few cases an induration persisted for 24 to 48 hours. A negative result was indicated by a weal of less than 1 cm. in diameter, without pseudopodia, redness or itching.

All 13 paragonimiasis cases gave positive results and 15 of 21 control subjects gave negative results. Of the remaining controls, 5 gave a modified reaction and 1 a reaction scarcely distinguishable from the positive; the last patient had schistosomiasis. [The controls included cases of schistosomiasis, taeniasis and filariasis, but the authors do not state whether the controls who gave a modified reaction included such cases.]

The reading at 15 minutes was the crucial one and there was little advantage in taking the other readings. An antigen 1 in 5,000 gave almost the same results.

L. E. Napier

CH' IEN, Mu-han. **Roentgenological Diagnosis of Paragonimiasis.** *Chinese Med. J.* Peking. 1955, Jan.-Feb., v. 73, No. 1, 37-46, 1 fig. on pl. [10 refs.]

An analysis is made of the X-ray findings in 61 cases of paragonimiasis; in all cases the ova of *Paragonimus westermani* had been found in the sputum.

In order to get the best skiagram of the *Paragonimus* cysts in the lung they should be as near as possible to the film so that when they are in the anterior part of the lung a postero-anterior picture will show them up best, whereas if they are in the posterior part an antero-posterior picture is best; when they are in the mediastinum an oblique picture is necessary. The use of a Potter-Bucky diaphragm is sometimes advisable.

The author considers that there are 4 stages in the development of the *Paragonimus* cyst, namely: (1) a diffuse infiltrated area of exudative pneumonitis surrounding the ovum, which clears up after a month or so, leaving a more clearly defined area of inflammation immediately around the parasite; (2) the inflammation disappears leaving a fibrous capsule surrounding the adult worm—the cyst stage; (3) the worm dies and the fibrotic changes penetrate into the cyst and form a dense and shrunken fibrotic nodule; (4) calcification occurs.

In the first stage the symptoms are fever and cough with sputum but no haemoptysis or ova in the sputum; in the second stage there is possibly low-grade fever and rusty sputum with haemoptysis and ova in the sputum; and the later stages are asymptomatic without either haemoptysis or ova in the sputum.

The corresponding X-ray pictures in the 4 stages are: (1) diffuse patches of density with irregular outlines; (2) isolated nodular shadows

containing vacuoles and showing lines radiating from the circumference, 8 to 37 mm. in diameter; (3) isolated denser shadows with only short radiating lines, 7 to 8 mm. in diameter; (4) very dense shadows, 2 to 5 mm.

[The author does not state in the text whether the ovum is still visible in the denser patch in the first stage, but in a diagram shows it as a clearly outlined shadow.]

A table of the size of the largest cyst in each case shows the 16 to 20 mm. group as the biggest (22 instances) with 21 smaller and 16 larger than this.

The number of cysts varied from 1 to 18; there was a single cyst in 20 cases and more than 6 cysts in only 4 cases.

A table indicating the position of the cysts according to zones shows cysts in the middle zone alone in 30 cases and with additional cysts in other zones in 22 cases, cysts in the lower zone alone in 5 cases and with additional cysts in other zones in 16 cases, and cysts in the upper zone alone in 3 cases and with additional cysts in the other zones in 13 cases.

The vacuoles are characteristic of *Paragonimus* cysts in the lungs and are not seen when the cysts occur in other organs. Cysts containing from 2 to 6 vacuoles were seen in 21 of the cases.

In 3 cases bronchograms showed lipiodol in the cysts. In few cases were the hilar shadows increased and none showed enlarged hilar glands. In 54 cases there was increased fibrosis and in 36 pleural thickening; 6 cases showed effusion and 1 empyema.

A table showing the points in the differential diagnosis of pulmonary tuberculosis and paragonimiasis is given.

L. E. Napier

GOVAERT, J. Étude quantitative de l'acide désoxypentosenucléique lors de la maturation et de la fécondation de l'oeuf chez *Fasciola hepatica*. [Quantitative Study of Desoxypentosenucleic Acid during Maturation and Fertilization of the Egg of *Fasciola hepatica*] *C.R. Soc. Biol.* 1955, May, v. 149, Nos. 9/10, 1066-9, 1 fig.

CHOWDHURY, A. B., DASGUPTA, B. & RAY, H. N. 'Kernechtrot' or Nuclear Fast Red in the Histochemical Detection of Calcareous Corpuscles in *Taenia saginata*. [Correspondence.] *Nature*. 1955, Oct. 8, v. 176, 701-2, 1 fig.

SILVERMAN, P. H. A Technique for studying the *in vitro* Effect of Serum on Activated Taeniid Hexacanth Embryos. [Correspondence.] *Nature*. 1955, Sept. 24, v. 176, 598-9, 2 figs.

Whereas a considerable literature exists concerning the *in vitro* effects of normal and of immune sera on various species of nematode and

schistosome larvae [this *Bulletin*, 1952, v. 49, 778; 1954, v. 51, 418], there are very few records of corresponding observations having been made on cestode larvae. This lack of information is probably due to the fact that reactions are unlikely to be observed until such time as the hexacanth embryo has freed itself from the enveloping membranes, previously described by the author [this *Bulletin*, 1954, v. 51, 1178; 1955, v. 52, 802]. In the present paper he describes his technique, and some of the various types of reaction which were observed when the free and active hexacanth embryos of *Taenia saginata* and *T. pisiformis* were immersed in normal and in immune sera.

R. M. Gordon

SEATON, D. R. **On Expelling Tapeworms with Mepacrine.** *Lancet*. 1955, Sept. 24, 644-5, 2 figs.

The author explains how frequent failures of male fern to remove tapeworms led him to try mepacrine instead. Three women infected with *Taenia saginata* were given, after two days' abstinence from solid food, 9 tablets of mepacrine, each containing 0.1 gm., by mouth, followed by a saline purge. The treatment of the first of these patients was successful, but the other two vomited the mepacrine and went on vomiting for a day. The author then reverted to male fern, but 6 consecutive failures led him to try mepacrine again, but to give it in solution by duodenal tube, in order to avoid gastric irritation and vomiting and to deliver a sudden, large concentration of it near the scolex of the worm, as recommended by HORNBOSTEL and DÖRKEN [this *Bulletin*, 1952, v. 49, 703].

The patient was kept at rest and given liquids only for 2 days, a saline aperient being given on each day and an enema on the second day. On the second evening 3 grains of sodium amytal were given and a Ryle's tube was passed. By the morning of the third day the end of this tube has usually passed well beyond the pylorus, as can be shown by radiography. Mepacrine, 1 gm., dissolved in 100 ml. of warm water, was then gently squirted down the tube with a syringe. Fifteen to 20 minutes later 1½ to 2 oz. of magnesium sulphate in 100 ml. of warm water was given in the same way. The tube was then withdrawn and the patient was given a hot drink. Purging usually began within an hour and the stools were collected and examined. The tapeworm comes away alive, stained with the mepacrine, tightly contracted and usually in a single piece.

The author has treated 6 men and 9 women by this method during the past 18 months. All were infected with *T. saginata* and all had 1 worm only, except one of the men, a butcher, who had two. In 12 of these 15 patients (4 men, 8 women) the complete worm was passed out. In 2 other patients, both men, the first treatment failed, but a second

treatment expelled the worm. In the remaining woman treatment failed because of difficulty in passing a sufficient length of the Ryle's tube.

These results are much better than those obtained by the author by any other method. The patient can be reasonably assured that he can get rid of his worm by 3 days of moderate discomfort. Preliminary starvation favours success and purging is essential. One failure was possibly due to the fact that a considerable length of the worm had been passed before treatment. There were no untoward effects other than occasional faintness during the action of the purge.

G. Lapage

VAN GRUNDERBEECK, R. & PENSON, D. La taeniasse en Ituri. Recherche d'une méthode de déparasitation massive adaptée à l'Ituri. Effets taenifuges de la Camoquin. [Taeniasis in Ituri. Investigation into a Method of Mass Treatment adopted in Ituri. The Taenifuge Effect of Camoquin] *Ann. Soc. Belge de Méd. Trop.* 1954, Dec. 31, v. 34, No. 6, 981-98.]

Taeniasis has become a serious problem, public health rather than medical, in the stock-raising territories of Ituri, Belgian Congo, especially Djugu, Bunia and Mahagi. The present investigation is based on figures taken from the medical subsection of Fataki, as only here has there been an accurate census and systematic examination during the last few years. This subsection has jurisdiction over a great part of the agricultural regions of Djugu.

In 1953 the total population was 110,179 of whom 93,260 (85 per cent.) were examined: taeniasis was diagnosed in 6,676 or 7 per cent. In the 3 previous years the percentages were 22.3, 10.8 and 7.3. (Between 80 and 90 per cent. of the cattle in the district are said to be infected.)

The commonest helminthic infection was *Ascaris*; *Taenia* was the second in frequency; and after this in order *Trichuris*, *Strongyloides*, hookworms and *Schistosoma*, the last named being negligible (0.2 per cent.). Division into smaller groups shows that the percentage of infection varies according to association with livestock, because of the habit of eating moribund or sick animals. While it is thus a veterinary problem also, veterinarians have practically no means of controlling bovine cysticercosis, whereas there are several drugs that cure human (intestinal) taeniasis.

The requirements for a suitable drug against tapeworm are:—(1) a high taenifugal action; (2) low toxicity; (3) easy applicability in mass treatment; (4) safety in frequent repetition of dosage, and, if possible, (5) therapeutic action against other infections.

According to these 5 qualities, and allowing a maximum of 2 marks for each, the authors have assessed the value of 8 taenifuges: extract of male fern (3), "pelletierine" (2), marrow seeds (7), a mixture of chloroform, chenopodium and castor oil (6), thymol, in large doses with

Epsom salts (5), and small doses without a purgative (6), StannoxyI (7), quinacrine [mepacrine] (8), and camoquin [amodiaquin] (10). [The figures in brackets after each drug are the scores.]

All were given the maximum score for their taenifugal action, except thymol with a purgative which only received 1 mark; the cure rate with this course is given as 50 per cent., whereas the authors claim to have produced 742 complete cures in 1,000 persons treated by the smaller dosage, 0.25 gramme a day for 8 days, without preliminary starvation or a purgative. For StannoxyI a 77 per cent. success in 530 cases and for quinacrine a 75 per cent. success in 441 patients are claimed.

Further details are given of the treatment of 133 Africans by camoquin. The result was known in 130 cases, and in these, worms were expelled within 24 hours in 96 cases. The other 34 patients were given a dose of StannoxyI (2.5 grammes) on the following day; of these, 31 expelled a worm within the second 24 hours but 3 required a second dose of StannoxyI before passing a worm. In a follow-up of 50 cases, after 5 months 42 were free from *Taenia* and 8 had relapsed or been reinfected, whereas after 8 months, of 47, 39 were free from *Taenia*. L. E. Napier

NEGhme, A., SILVA, R. & DE LA VEGA, J. L. *Hymenolepis nana* en Chile. II. Comunicación sobre aspectos epidemiológicos. [*Hymenolepis nana* in Chile. II. Report on Epidemiological Aspects] *Bol. Chileno de Parasit.* 1955, Apr.—June, v. 10, No. 2, 22–3.

The English summary appended to the paper is as follows:—

“The authors point out the observations gathered about *Hymenolepis nana* in the coprological survey they have performed in all the country. Besides, they communicate that in the out-patient clinic for parasitic diseases 412 patients with *H. nana* have been diagnosed in 1953 and 1954. In the latter year, a total of 1,299 patients were examined in this Service and of them 265 were infected with *H. nana* (20.4%).”

MOLLOY, P. J. **Pericardial Hydatid Cysts.** *New Zealand Med. J.* 1955, June, v. 54, No. 301, 267–70, 4 figs. on 2 pls. [12 refs.]

“Two cases of hydatid disease involving the pericardium are described. The incidence, mode of infestation and treatment are briefly discussed.”

MAIZELS, G. **Hydatid Disease of the Fallopian Tubes.** *South African Med. J.* 1955, Sept. 3, v. 29, No. 36, 829–30, 1 fig.

“Advanced hydatid disease (echinococcosis) of both Fallopian tubes, part of an extensive and oldstanding abdominal infection, is described in a multiparous Bantu female.”

PALMER, E. D. **Course of Egg Output over a 15 Year Period in a Case of experimentally induced *Necatoriasis americanus*, in the absence of Hyperinfection.** *Amer. J. Trop. Med. & Hyg.* 1955, July, v. 4, No. 4, 756-7.

This brief, but very interesting, paper records the results of egg counts done over a period of 15 years, on the faeces of a 21-year-old white male who was originally infected with an undetermined number of larvae of *Necator americanus*. The results of egg counts done during the first 151 days of this period of infection were recorded by the author [this *Bulletin*, 1942, v. 39, 98]. Attempts made with tetrachlorethylene and carbon tetrachloride to eradicate the infection failed, only 2 female worms and 1 male being recovered, but these attempts did not affect the egg counts. The author feels sure that "hyperinfection" did not occur during the 15 years of egg counting; the subject lived during this time in urban areas in the United States and was engaged on professional work in hospital surroundings and had very little contact with the soil. He had no prolonged fever or other illness that might have influenced the egg counts.

The egg counts were done with the technique described by Palmer (*loc. cit.*). On 34 occasions the total 24-hour faeces of the subject were collected on each of 3 successive days. Each day's specimen was weighed and the whole specimen was suspended in 9 times its weight of tap water by means of a mechanical paddle. The numbers of eggs in 3 samples of 0.15 ml. each were then counted. The results show that no eggs were found in specimens examined in the 15th year of the infection, so that the infection had then died out naturally. A table gives the eggs per gramme found in samples examined at intervals of about a year (except that during the first year they were examined more often) and also the total eggs passed per day. By the eleventh month of the infection the total eggs passed per day was 799,300 and this level rose gradually until at 3 years 3 months the number of eggs passed totalled 1,000,000. The level then fell until, at 5 years 11 months, it was 731,000. During these 6 years, therefore, the level of egg production was, on the whole, maintained. Subsequently, however, the total eggs passed per day fell gradually until in the 15th year it was 0.

G. Lapage

BECKETT, A. H. & JOLLIFFE, G. O. **A Note on the Determination of Ascaridole in Oil of *Chenopodium*.** *J. Pharmacy & Pharmacol.* London. 1955, Sept., v. 7, No. 9, 606-7.

ALHADEFF, R. **Clinical Aspects of Filariasis.** *J. Trop. Med. & Hyg.* 1955, Aug., v. 58, No. 8, 173-9, 4 figs.

The author describes the clinical findings in 33 cases of acute filariasis in Mauritian troops stationed in the Suez Canal Zone in 1950-52. Some

of the patients had had attacks in Mauritius similar to those which led to their admission to hospital in Egypt; in these cases the disease had presumably been contracted in their native land. Elephantiasis is, however, endemic in Egypt and it is on record [TODD and WHITE, this *Bulletin*, 1919, v. 14, 154] that 25 cases of elephantiasis occurred in villages near Cairo and in one village 47.5 per cent. of the inhabitants harboured microfilariae in their blood; 5 other villages on the west side of the Delta were similarly affected.

The clinical features of these 33 cases were those usually found in acute cases and the high proportion in which positive evidence of the presence of *Wuchereria bancrofti* was found will be seen from the following table (abridged from original):—

Clinical findings	No.	Microfilariae			Previous attacks	Chyluria	Adenitis
		in blood	in urine	in fluid			
Funiculo-epididymo-orchitis	8	5	1	1	in 4	1	8
Funiculo-epididymitis	5	3	—	—	in 2	—	5
Funiculitis	5	1	2	1	in 2	2	5
Lymphangitis	4	2	—	—	in 2	1	4
Deep abscesses in muscles	3	2	—	—	in 2	—	3
Chronic hydrocele	3	—	—	1	in 2	—	3
Filarial colic	2	—	1	—	in 2	2	2
Lymphocele of cord	1	—	—	1	in 1	—	1
Suppurative adenitis	2	—	1	—	in 1	1	2
	33	13	5	4	in 18	7	33

Enlargement of lymph nodes was present in all cases and inflammatory lesions of the cord, with or without involvement of the epididymis or testicle, were found in 18 patients, of whom 9 had microfilariae in the blood, 3 in the urine and 2 in the aspirated fluid. The author emphasizes that early cases should be diagnosed on clinical grounds, even when pathological proof is lacking. Treatment by Banocide (diethylcarbamazine) in oral doses of 100 mgm. q.i.d. for 21 days was found to reduce the number of circulating microfilariae. The illustrations show the weals produced in intradermal tests with *Dirofilaria immitis* antigen.

[Cases of elephantiasis and filarial hydrocele, as commonly met with, are of long standing and all tests are negative, except during acute attacks of lymphangitis. MICHAEL (*ibid.*, 1944, v. 41, 956) states that several thousand blood examinations proved negative in cases where a diagnosis of filariasis seemed certain on clinical grounds.]

W. L. Harnett

NEVILL, L. **A Preliminary Trial of the Use of Banocide as a Prophylactic against Filarial Fever.** *East African Med. J.* 1955, Aug., v. 32, No. 8, 337-40, 1 diagram.

The author selected for this experiment an area in Kenya in which filariasis and elephantiasis were prevalent. Blood slides from 281 persons living in a village were examined and yielded 12 with microfilariae. The positive blood slides and cases with filarial fever occurred only in people living in one part of the village. Diethylcarbamazine (Banocide) was administered daily for 6 weeks to 70 adults and 51 children and twice weekly [misprinted "twice daily"] to 53 adults and 29 children. "Calcium" tablets were administered as a control to 51 adults and 37 children. Filarial fever was terminated in those taking Banocide but at the end of the experiment blood slides were also negative in the control group. Banocide having proved to be a popular drug, the author thinks it is possible that some in the control group may have obtained this drug secretly. The experiment indicates that Banocide is of temporary therapeutic value, but, before recommending it as a prophylactic, further attention should be paid to the ecology of the host-parasite relationship and the possible toxic effects of long continued administration.

Frederick J. Wright

See also p. 109, LAIRD, **Notes on the Mosquitos of the Gilbert, Ellice and Tokelau Islands, and on Filariasis in the Latter Group.**

RACHOU, R. G. & DEANE, L. M. Filarioses humanas no Brasil. Conhecimento atual de sua distribuição geográfica e transmissão. [**Present Knowledge of the Geographical Distribution and Transmission of Filariasis in Brazil**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1954, July, v. 6, No. 3, 377-87. [22 refs.]

The English summary appended to the paper is as follows:—

"1. In Brazil, from the data available at present, autochthonous infections by *Wuchereria bancrofti* are known to occur in Manaus (State of Amazonas), Vigia, Bragança and Cametá (State of Pará). Recife (State of Pernambuco), Maceió (State of Alagoas), Salvador (State of Bahia), Florianópolis and Ponta Grossa (State of Santa Catarina) and Porto Alegre (State of Rio Grande do Sul); *Mansonella ozzardi* is endemic in Manaus, Tefé, Fonte Boa, São Paulo de Olivença, Benjamin Constant, Remate de Males, Maria Açu and Ataláia (State of Amazonas).

"2. *W. bancrofti* occurs principally along the coast, with a spotted distribution; in few localities its incidence is high enough as to make it an important public health problem. *M. ozzardi* is found in the interior and, so far, has only been encountered in the forested plains of the Amazon Region, sparsely inhabited by a population with a preponderance of the Indian element.

" 3. All cases of Bancroftian filariasis studied, both in the North and South of the country, harbored embryos with a definite nocturnal periodicity.

" 4. The usual vector of *W. bancrofti* in the country is *Culex fatigans*, although other species of mosquitoes can transmit the parasite as secondary vectors."

RACHOU, R. G., FERREIRA, M. O. & LIMA, M. M. Inquérito de filariose bancroftiana em Florianópolis, Capital do Estado de Santa Catarina. [**Survey of *W. bancrofti* Filariasis in Florianópolis, Brazil**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1954, Apr., v. 6, No. 2, 189-204, 4 graphs & 2 maps.

The English summary appended to the paper is as follows:—

" The authors carried out an epidemiological survey to ascertain the incidence and transmission of bancroftiasis in Florianópolis, capital of Santa Catarina State (27° 35' 17" S and 48° 32' 57" W). They examined the blood taken at night from 3,663 inhabitants (7.2% of the population), obtaining a microfilaria rate of 1.4% and an average count of microfilariae of 8.3 (20 cmm of blood per sample). *Culex fatigans* was found naturally infected (2.5% among 1,302 dissected specimens); 0.5% from the dissected specimens harbored infective larvae. The authors conclude that the incidence of bancroftiasis is low in Florianópolis, although the so called zone 1 ought to be considered as a focus of relative importance."

RACHOU, R. G., LACERDA, N. B. & COSTA, A. Primeiros inquéritos de filariose no Território do Acre. [**Preliminary Studies of Filariasis in the Territory of Acre, Brazil**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1954, July, v. 6, No. 3, 407-8.

The English summary appended to the paper is as follows:—

" In the hemoscopic survey for microfilariae, realized in four localities of the Territory of Acre, no autochthonous cases of filariasis were found. Only one carrier of *W. bancrofti* has been found, imported from Belém of Pará."

NEVES, H. de A. Da pesquisa de microfilárias de *Wuchereria bancrofti* pela escarificação da pele. [**Investigation of Microfilariae of *W. bancrofti* by Scarification of the Skin**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1954, July, v. 6, No. 3, 365-6.

The English summary appended to the paper is as follows:—

" The superficial scarification of the skin in order to obtain dermal juice, considered by Van den Berghe and Chardome (1951) as an easy

and more accurate means of diagnosing malaria parasites and microfilarias of both blood and skin, was tried in Belém (Pará) for diagnosis of microfilarias of *W. bancrofti*, without good results. 94% of 31 carriers revealed microfilarias in blood samples; the dermal juice smears of the same carriers, at the same time, were all negative."

RACHOU, R. G. Da falta de correlação entre a periodicidade das microfilárias de *Wuchereria bancrofti* e o nascer e o ocaso do sol no Norte e no Sul do Brasil. [**Lack of Correlation between Periodicity of Microfilariae of *W. bancrofti* and Sunrise and Sunset in North and South Brazil**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1954, July, v. 6, No. 3, 395-405, 6 graphs.

The English summary appended to the paper is as follows:—

"The author demonstrates that the different hours of higher microfilariæmia of *W. bancrofti* in Belém (1 a.m.) and in Florianópolis (4 a.m.), respectively in the north and in the south of Brazil, are not due to the different hours of dawn and of sunset occurring in these two cities."

RACHOU, R. G., GARCIA, Wanda & MARTINS, Josélia S. Do diagnóstico diferencial entre as microfilárias de *Wuchereria bancrofti* e de *Mansonella ozzardi*. [**Differential Diagnosis between Microfilariae of *W. bancrofti* and *Mansonella ozzardi***] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1954, Apr., v. 6, No. 2, 289-93, 1 fig.

The English summary appended to the paper is as follows:—

"The authors state that to make the differential diagnosis between microfilariae of *W. bancrofti* and *M. ozzardi*, the presence or absence of the sheath is not enough; microfilariae of *bancrofti*, normally sheathed, can be unsheathed as occurred at Pôrto Velho (Territory of Guaporé). To be sure it is necessary to analyse other characteristics. Microfilariae of *bancrofti* are longer and wider than those of *ozzardi*, the length of these being about $\frac{2}{3}$ and the width $\frac{1}{2}$ of the first. The somatic nuclei in *bancrofti* are large, round, and not close distributed, so they can be easily individualised; in *ozzardi* they are smaller, elongate, and crowded together. The 4 to 11 (in general 7) terminal nuclei in *bancrofti*, not reaching the tip and evenly spaced, form a column preceded by a pair of nuclei, obliquely disposed; this pair of nuclei is very constant (95%). In *ozzardi* the terminal nuclei do not reach, also, the tip of the microfilaria, and they are so closely distributed, one after the other, that their limits can hardly be seen; this arrangement gives to the terminal nuclei the aspect of a line; the pair of nuclei is absent."

RACHOU, R. G., AZAMBUJA, C. E. A. & SOUZA, P. S. Comprimento e largura das microfilárias de *Mansonella ozzardi* e de *Wuchereria bancrofti* no Brasil. [**Length and Breadth of Microfilariae of *Mansonella ozzardi* and *W. bancrofti* in Brazil**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1954, July, v. 6, No. 3, 419-27, 2 graphs.

The English summary appended to the paper is as follows:—

“The authors measured 200 microfilariae of *Mansonella ozzardi* and 400 of *Wuchereria bancrofti* (200 of the north and 200 of the south of Brazil). The average length of the microfilariae of *ozzardi* was 191 *micra*; the minimum 150 and the maximum 244 *micra*; the average breadth was 2.9 *micra*, the minimum 2.6 and the maximum 4.0 *micra*.

“The average length of the microfilariae of *bancrofti* (excluding the sheath) was 292 *micra*, the minimum 224 and the maximum 408 *micra*; the average breadth was 6.0 *micra*, the minimum 5.0 and the maximum 9.2 *micra*. In the north the microfilariae were a little longer and a little narrower than in the south of the country. The average length of the sheath was 304 *micra*, the minimum 233 and the maximum 420; the average breadth was 11.4 *micra*, the minimum 9.2 and the maximum 14.5. The sheath of the microfilariae of *bancrofti* in the north was shorter than in the south, the breadth being practically the same in both regions.”

DEANE, L. M., RACHOU, R. G., LACERDA, N. B. & MARTINS, Josélia S. Alguns dados relativos à prevalência da *Mansonella ozzardi* no Brasil. [**Observations on the Prevalence of *Mansonella ozzardi* in Brazil**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1954, Apr., v. 6, No. 2, 219-24. [10 refs.]

The English summary appended to the paper is as follows:—

“In Brazil, up to the present, *Mansonella ozzardi* has been found in nine localities, all in the forested plains of the Amazon Region, West of Manaus. The prevalence of this filaria in the region is high, specially among adults, males and the miscegenated group (predominantly of Indian origin). This prevalence leads the authors to believe that an outdoor feeding insect is the vector of this filaria in the area.”

RACHOU, R. G., LACERDA, N. B. & SANTOS, D. Inquérito hemoscópico para pesquisa de microfilárias em Boa Vista, Capital do Território do Rio Branco. [**Blood Examination for Investigation of Microfilariae in Boa Vista, Brazil**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1954, July, v. 6, No. 3, 409-10.

The English summary appended to the paper is as follows:—

“Examining the blood of 837 persons in Boa Vista, Capital of the

Territory of Rio Branco, the authors found only 2 carriers of *M. ozzardi*, both considered as imported cases."

RACHOU, R. G. & LACERDA, N. B. Da variação horária da microfilaremia de *Mansonella ozzardi*. [**Hourly Variation of Microfilaraemia of *Mansonella ozzardi***] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1954, July, v. 6, No. 3, 343-8, 2 charts.

The English summary appended to the paper is as follows:—

"The authors examined 24 samples of 20 c.mm of blood from each of 47 carriers of microfilariae of *Mansonella ozzardi* in the Amazon Region (Brazil). Each sample corresponded to one of the 24 hours of the day. No periodicity has been observed."

RACHOU, R. G., FERREIRA, M. O. & LIMA, M. M. Resultados preliminares de uma prova de campo para comparação da eficácia de 3 inseticidas de ação residual aplicados no interior das casas para combate ao *Culex fatigans*. [**Preliminary Results of a Field Test for Comparing the Efficacy of Three Residual Insecticides applied to the Interior of Houses for the Control of *Culex fatigans***] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1954, Apr., v. 6, No. 2, 159-72, 6 graphs.

The English summary appended to the paper is as follows:—

"The authors present the results of the first 6 months of the experiment they are conducting in Florianópolis (mean temperature: 22°-16°C.) to evaluate the efficacy and the residual effect of three insecticides, applied indoors—BHC, DDT and Dieldrin—to control *Culex fatigans*, the vector of bancroftiasis in Brazil. The preliminary results indicate: 1) a very good residual effect of BHC-emulsion and of Dieldrin for six months; 2) lower effectivity of BHC-suspension as compared with BHC-emulsion; 3) DDT as the least efficient of the three tested insecticides. The long residual effect of BHC-emulsion is probably due to the low temperature of the region."

KERSHAW, W. E., LAVOPIERRE, M. M. J. & BEESLEY, W. N. **Studies on the Intake of Microfilariae by their Insect Vectors, their Survival, and their Effect on the Survival of their Vectors. VII.—Further Observations on the Intake of the Microfilariae of *Dirofilaria immitis* by *Aedes aegypti* in Laboratory Conditions: the Pattern of the Intake of a Group of Flies.** *Ann. Trop. Med. & Parasit.* 1955, June, v. 49, No. 2, 203-11, 5 figs.

In a previous paper [this *Bulletin*, 1954, v. 51, 83; see also *ibid.*, 963, 1955, v. 52, 66, 186 and 1125] the actual intake of microfilariae of *Dirofilaria immitis* by *Aedes aegypti* fed on an infected dog was compared with the expected intake, the latter being calculated from the weight of

blood ingested by each mosquito and the number of microfilariae that such amounts of blood would be expected to contain from the known density of microfilariae in the dog's blood stream. This paper approaches the topic from a different angle.

The average weight of blood ingested was 3 mgm. per mosquito with a range of less than 0.5 mgm. to just over 6 mgm. The possibility of there being one population of mosquitoes taking small blood meals and another group feeding much more fully is examined but the data do not support this view. The value of 3 mgm. remains, despite certain statistical imperfections, the best available index of the average amount of blood taken in by a mosquito. The geometric mean is the chosen measure of average tendencies used in the comparative treatment of different data. The comparisons on the intakes by the mosquitoes and the reservoir of microfilariae in the dog from which they ingest the microfilariae are restricted to mosquitoes taking up 3 mgm. or less of blood. Mosquitoes taking up more than this amount died within two days of the blood meal, almost certainly from adverse effects of excessive microfilarial intake rather than of over-engorging.

The abstracter has to admit that he is not very certain of the meaning and implications, in relation to the number of microfilariae in the dog's circulation, of the phrases "population exposed" and "population at risk": these are defined respectively as "the synthetic population which provided all the blood-meals, made up of hypothetically different dogs, each corresponding to a separate occasion on which a fly was fed", and "the corresponding synthetic population providing the blood-meals, made up of hypothetically different dogs, each corresponding to a separate occasion on which a group of flies was fed on the same dog". Nevertheless, the conclusions seem to be that a group of mosquitoes feeding on a dog would, together, be expected to ingest a little more than half the number of microfilariae expected of them from the numbers circulating in a dog's blood stream. But, taking account only of those mosquitoes likely to survive to transmit the infection (that is, those taking in 3 mgm. or less of blood) the actual intake by this limited group is about half that by the whole group of mosquitoes. In other words, for this infection and vector, those mosquitoes which will usually survive to transmit the infection take up initially only about a quarter of the number of microfilariae which would be expected of them on the basis of the density of microfilariae in the host's blood stream.

[The use throughout the text of the word "fly" for "mosquito" seems undesirable, even although it could be argued that such usage was not wholly wrong.]

D. S. Bertram

JAMISON, D. G., KERSHAW, W. E., DUKE, B. O. L. & FEJER, E. A.
Studies on the Structure of the Skin in the Normal African and on the Changes associated with Infection with *Onchocerca volvulus*.

I.—Preliminary Observations based on the Findings in the Lower Leg. *Ann. Trop. Med. & Parasit.* 1955, June, v. 49, No. 2, 227–33, 3 text figs. & 4 figs. on pl.

The structure of normal skin was investigated by means of skin samples taken from the sternal, axillary, anterior tibial and deltoid regions in 5 young (20–24) and 6 old (45–60) African subjects in the course of post-mortem examinations made at the University College Hospital, Ibadan, Nigeria. Samples were taken within 12 hours of death, fixed in formol saline for 24 hours, and stored in 70 per cent. alcohol. Paraffin sections were stained with haematoxylin and eosin, with Van Gieson for fibrous tissue and orcein for elastic fibres.

Skin biopsies were taken from volunteers in the British Cameroons. A piece of skin 2 cm. by 1 cm. with subcutaneous fat was removed from the calf, thigh, upper arm and forearm. The concentration of microfilariae in the skin was taken by a count from weighed skin snips 2 cm. from the biopsy incision. The biopsy samples were treated in the same way as the samples of normal skin.

In the normal skin the thickness of the epidermis, subepidermal zone and dermis, the degree of pigmentation and papillation and the size and distribution of elastic fibres were relatively constant in the young adult male group. In the older group the pattern was variable, the three layers were thinner, pigmentation and papillation reduced, the subepidermal elastic fibres diminished and thickened, while the dermal elastic fibres were thicker and more irregular in their pattern of orientation.

In skin affected with *O. volvulus* the first change is a diminution in the number of subepidermal elastic fibres. This may be due to damage of the epidermal and other cells affecting the normal production and maintenance of the subepidermal connective tissue.

In moderate and more advanced infections there is a progressive reduction in the number of both subepidermal and dermal elastic fibres. In the final "burnt out" stage, when no microfilariae are present, there is an increase in the deep elastic plexus but a total absence of subepidermal elastic fibres, suggesting that by this stage the cells responsible for the production of elastic fibres are no longer capable of re-forming a subepidermal elastic layer. The reduction of pigmentation, increased thickness of the epidermis, and marked proliferation of connective tissue in the subepidermal zone in the "burnt out" case might all possibly be ascribed to the effects of a disturbance of metabolism of the epidermal cells.

Although there is a relationship between the histology of the lesions and the concentration of microfilariae, there is no evidence of reaction in the neighbourhood of individual microfilariae which lie in tissue spaces or in spaces in a collagen matrix apparently produced by chemical or metabolic activity of the microfilariae.

H. T. H. Wilson

FENG, L. C., TUNG, M. S. & SU, S. C. **Two Chinese Cases of Gongylonema Infection. A Morphological Study of the Parasite and Clinical Study of the Cases.** *Chinese Med. J.* Peking. 1955, Mar.-Apr., v. 73, No. 2, 149-62, 10 figs. (6 on 2 pls.).

Gongylonemiasis is not a common infection in man and hitherto only 16 cases have been reported. The authors add 2 new cases of infection by the nematode worm *Gongylonema pulchrum*. Both infections were in young Chinese women; each complained of spitting blood and reported the recovery of a thread-like worm from a papule under the tongue.

The first patient had pulmonary tuberculosis and remained under observation for only a short time. She reported having removed 2 thread-like worms from papules under the tongue, which she had previously felt and seen moving in the mucous membrane in this region. A male *Gongylonema pulchrum* was extracted from a papule under the tongue and preserved for examination. The patient's stools showed no ova.

The second patient gave a similar history of blood spitting, but also complained of tarry stools and a pain in the chest of over a year's duration, and more recently of numbness and limitation of movement in the tongue that made speaking difficult; the latter symptoms disappeared after she had removed a worm from a blister under the tongue, but the whole incident was repeated a few months later.

Clinical and X-ray examination showed nothing of note, but oesophagoscopy, which was performed on 6 occasions during her stay of 5 months in hospital, showed a hypertrophic, wrinkled, and bleeding mucosa with erosions at several points in the oesophagus; on one occasion there was an extensive mucosal defect, 1 cm. by 1 cm., which had healed a week later. Biopsy specimens were taken and one such revealed a nematode egg. One specimen of bloody sputum also showed an egg.

On one occasion during stay in hospital when the patient felt a worm moving under her tongue a coiled worm could be seen moving under the mucosa. This was removed intact and found to be male *Gongylonema pulchrum*. Several drugs, including neoarsphenamine, were administered without effect on the symptoms and she was eventually discharged after 5 months in hospital. The blood spitting in this case was undoubtedly due to the worm infection.

The male worms were examined and are described in detail with 6 good drawings. "The description of the specimens in general agrees with that recorded in the literature. Certain details, especially those regarding the structure of the head, have been added. We found that there are two distinct lateral lips which show indications of 3 lobes each bearing a papilla. There are also a small dorsal and a small ventral accessory lip, each of which also bears a papilla. These 8 papillae form the inner circle. Outside the lips is a collar or rim, and beyond this is another

circle of 8 papillae, two on each submedian corner of the dorsal and ventral sides and two amphids, one on each of the lateral sides."

There are some good photomicrographs of histological specimens taken from cattle with this infection.

L. E. Napier

BERGSTERMANN, H. & BOGNER, K. Piperazin-Zitrat zur Behandlung der Oxyuriasis. [**Piperazine Citrate for the Treatment of Oxyuriasis**] *Deut. med. Woch.* 1955, Sept. 2, v. 80, No. 35, 1260-61. [14 refs.]

Enterobiasis is still today extraordinarily widespread, especially in children. Although it has, in recent years, somewhat abated, the authors' latest work revealed an incidence, in Munich orphanages, of about 80 per cent., but they had the impression that troublesome cases were rather fewer because of better hygiene and better nutrition, and were due mostly to massive infection.

The authors discuss modes of infection and the survival of the eggs. Remedies should be sufficiently effective and of low toxicity, but, until a few years ago, no remedy fulfilled these requirements. Among the remedies recently tested by the authors, much the best was a compound of citric acid and piperazine hydrate called Tasnon. Children liked this preparation, its toxicity was low and no patient showed intolerance of it.

The authors quote several other papers on the use of piperazine for enterobiasis [see this *Bulletin*, 1951, v. 48, 486; 1954, v. 51, 86, 87, 1281; 1955, v. 52, 675] and record results of their work on 368 children in Munich orphanages. These children live in groups of about 20 and are grouped according to age, junior school pupils and others being sometimes grouped together. Children over 14 were not included in the investigation. Cellophane swabs were taken in the morning immediately after the children rose and before they washed. The incidence varied in the different groups. In one examination of untreated children it was about 70 per cent.; in several others it varied from 10 to 15 per cent. No conclusions could be drawn about the intensity of the infection from the number of eggs on the swabs; a massive number of eggs can be derived from a single female worm and the course of the infection makes interpretation of statistics difficult. The authors based their results on a single examination done sometimes 3 days after treatment. In many cases they did numerous examinations before and after treatment, but this only slightly altered the results. They therefore considered a single examination of a sufficient number of patients to be adequate for the comparison of the various anthelmintics tested.

Of the 368 children treated with various remedies, 88 of them, divided into 4 groups, were treated with Tasnon. Subsequent examinations of 86 of these children was possible and of these 66 were positive before treatment and only 13 were positive after it. The cure rate, based on a single examination, was thus over 80 per cent.

The following table shows the doses given, the numbers of patients and the results:

Group	Age in Years	Dose	No. of patients	Results before Treatment		Results after Treatment
				Negative	Positive	Positive
1	3-6	1 teaspoon 3 times daily	15	4	11	2
2	6-11	ditto	46	11	35	7
3	3-14	ditto	16	1	15	4
4	12-14	1 small table-spoonful 3 times daily	9	4	5	0
Totals			86	20	66	13

This dosage amounted to 2.4 gm. piperazine citrate daily and this daily dose was given for 1 week. Thus all the children in the small fourth group given the larger dose were cured.

The authors have also confirmed the value of piperazine citrate for the treatment of adults with enterobiasis and ascariasis; it was tolerated very well, but the numbers treated have been so few that statistical proof of its efficacy has not been possible.

G. Lapage

DEFICIENCY DISEASES

FAWDRY, A. L. **Syndrome of Splenomegaly, Anaemia, and Hepatomegaly often Left-Lobed in South Arabia.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, July, v. 49, No. 4, 387-98, 7 figs. (5 on 2 pls.) [14 refs.]

Gross enlargement of the spleen and of the liver, with an associated anaemia, is not uncommonly found in patients arriving at Aden Civil Hospital from Southern Yemen and the West Aden Protectorate. The

Banti syndrome has been reported by other workers to occur widely over Arabia. The areas from which the patients under immediate consideration arrived are barren and dry; life is hard and monotonous; 80 to 90 per cent. of the calories and protein in the average diet are derived from two forms of millet; meat is eaten only once a month. Malaria is hyperendemic in some areas; *Schistosoma mansoni* infection is widespread, though the vector snails are patchy in distribution; hookworm infection is rare.

Some 70 cases of the condition were studied; males, in childhood (over 5 years) or adolescence, predominated. The usual complaints were general weakness and abdominal swelling; usually there was a history of fever, sometimes some months earlier. The fever was not due to malaria, which most of the patients had experienced in infancy; it was continued, and was associated with the development of a left-sided abdominal swelling which persisted. The patients were stunted and thin, with a distended belly; 20 per cent. had hyperpigmentation over the nose, eyebrows, cheeks and lips; the lower ribs were often splayed, and the edges of the enlarged liver and spleen could often be seen. In spite of the poor nutrition classical signs of vitamin deficiencies were absent. Genital underdevelopment was found in 10 per cent. of cases. The triad of splenomegaly, hepatomegaly and anaemia, or one or two of these, was usual; enlargement of the liver alone was rare. A summary of the history and clinical findings and of laboratory studies of 26 cases is set out in a table.

Of the 70 enlarged spleens all were hard, notched and mobile, but they were not tender; 34 were well below the umbilicus. At operation the spleen was found to be engorged; when drained of blood—in one case a litre—the spleen rapidly shrank. Smears taken from 42 of the spleens by puncture yielded no *Leishmania*; the cell count was essentially normal; in only 2 spleens was malaria pigment seen; malaria parasites in one only.

The anaemia was microcytic or hypochromic, or both, in 6 patients without splenomegaly; macrocytic in 9, of whom 2 were splenomegalic; and normocytic in 28, of whom 21 had enlarged spleens. The anaemia was moderate in those 28 patients in the hospital; but this may be due to the fact that a low degree of anaemia precluded admission to the hospital, while a more severe prevented the patients from travelling there; the leucocyte count was less than 4,000/cmm. in half the patients. There was no significant rise in the icterus index, or fall in plasma protein; but the globulin values were high, and dilution of the serum with water produced a white cloudiness. The marrow was normal; in one case *Plasmodium falciparum* and pigment were found. The anaemia was not of the pernicious-anaemia or iron-deficiency type.

The liver swelling was rarely noticed by the patients, though it could readily be felt; the edge was sharp, firm and smooth. In half of the patients the left lobe was much more enlarged than the right; this was

confirmed on occasions at operation or post mortem. Needle biopsy was done on 50 patients (one died of haemorrhage) and sections showed a gross multilobular fibrosis in some cases. A patchy cellular infiltration was usual in the portal tracts or in the parenchymal sinusoids, due in the latter case to proliferation of the Kupffer cells. Schistosomal pseudo-tubercles were found in 2 cases and the remains of trematodes in one.

The course of the untreated disease was deduced by integrating clinical observations on different cases over a period of years. A fair proportion died of intercurrent infections; some few seemed to recover spontaneously. In the areas where patients with this syndrome live a comparable syndrome of advanced cirrhosis and ascites is common; these two syndromes probably are the same condition at different stages. If ascites is old-standing there may be oedema of the legs; jaundice is rare even with advanced cirrhosis, but haematemesis is not uncommon.

Improvement may follow rest and good feeding, with a higher protein intake than the patients have been used to, over a period of 6 to 8 weeks; but this is not always the case. Antimalarial or schistosomicidal treatment is of no benefit; oral iron and parenteral liver have equally failed to benefit the patients. Splenectomy has been done on about a dozen patients; there was some clinical improvement immediately thereafter, but in only 2 cases was an adequate follow-up possible; in these two there was marked progressive improvement in the general health and condition of the patients.

The author concludes that dietary protein deficiency and malaria, in combination, could account for the condition he has described; this view is supported by workers elsewhere in the tropics where similar syndromes are encountered. He thinks that splenectomy is desirable in these cases when the organ is inconveniently large, when there is a refractory anaemia, and when there is liver enlargement without gross fibrosis.

A. R. D. Adams

SÉNÉCAL, J., DUPIN, H., LABOUCHE, C., MAINGUY, P. & CRÉMOUX, A.
Utilisation des farines de poisson dans l'alimentation de l'enfant.
[Utilization of "Fish-Flour" for the feeding of Children] *Bull. et Mém. École Préparatoire Méd. Pharm. de Dakar*. 1954, v. 2, 108-18, 2 charts.

The English summary appended to the paper is as follows:—

"In order to remedy proteids deficiency, the authors suggested the use of 'fish flour'. Different samples of this were prepared by the Fishing Service from the various fishes of the Dakar region.

"This 'fish-flour' was given to children; the experience has shown that:

"The variety of fish best tolerated is the 'meagre' fish. Other information on this variety of fish, such as size, seasonal habits or,

conversely, possible fishing for the whole year, shallow or deep fishes, are decisive factors for the manufacturing.

"*The maximum amount of 'fish-flour' accepted by the child:* it varies according to age, being as high as 60 g. daily in a 7-year-old child, 30 to 50 g. in a 2-year-old one. In the whole, the tolerance exceeds the dose that would be adequate.

"*The minimum tolerance age for these flours.* The authors could prescribe up to 12 g. a day to a 5-month-old infant, which is evidence that the preparation is suitable as a supplementary food from 8 months of age and especially at the time of weaning."

SCRIMSHAW, N. S., BEHAR, M., PÉREZ, C. & VITERI, F. **Nutritional Problems of Children in Central America and Panama.** *Pediatrics*. Springfield, Ill. 1955, Sept., v. 16, No. 3, 378-97, 13 figs. [52 refs.]

HAEMATOLOGY

BERRY, C. G. **Anaemia of Pregnancy in Africans of Lagos.** *Brit. Med. J.* 1955, Oct. 1, 819-23. [13 refs.]

This paper reports observations on 30 pregnant African women seen in Lagos, Nigeria. The remarkable facts are: (1) that a number of them showed megaloblastic anaemia which is considered rare in Africans, and (2) that this megaloblastic anaemia of pregnancy, which in temperate climates responds to treatment with folic acid, was treated by the author with vitamin B12.

Although many of the women were profoundly anaemic, few complained of symptoms such as serious weakness or dyspnoea on exertion. One girl presented herself at the out-patient department, having walked unaccompanied to the hospital, with a red-cell count of 915,000 per cmm. and a haemoglobin concentration of 3.2 gm. per cent. She would admit to no symptoms other than those of pregnancy. In 20, deficiency of haemopoietic principle was diagnosed on the basis of finding, in the bone-marrow, either typical Ehrlich megaloblasts (7), or intermediate megaloblasts (6), or abnormal white cells only (7). Thirteen were treated with vitamin B12 and iron, 9 during pregnancy and 4 immediately after delivery. Two did not respond to vitamin B12 or to any other treatment. One of them was possibly a case of sickle-cell anaemia and the other showed a very hypoplastic marrow with no evidence of active erythropoiesis. In two others it was not possible to be certain that the recovery was not spontaneous and the "response" to vitamin B12 coincidental. In the

others vitamin B12 together with iron led in every case to a considerable improvement of the anaemia. Details are given of each of these cases. Unfortunately the congestion at the maternity hospital caused patients to be discharged as soon as the haemoglobin concentration had reached a level of 7 to 8 gm. per cent. and many failed to reappear at the out-patient department for check-up.

The general conclusion at which the author arrives is that all such patients should be treated with iron, and that many will respond to vitamin B12 in doses of 100–200 microgrammes and that folic acid may be necessary in addition for complete remission of the anaemia.

H. Lehmann

FOY, H., KONDI, ATHENA & MANSON-BAHR, P. E. C. **Penicillin in Megaloblastic Anaemias of Africans. Effect on Serum-Vitamin B₁₂ Levels and Absorption of Radioactive Vitamin B₁₂.** *Lancet*. 1955, Oct. 1, 693–9, 7 figs. [28 refs.]

The first two authors have previously reported that there were two types of response to therapy in Kenya Africans with megaloblastic anaemia [*Brit. Med. J.*, 1951, Feb. 24, 380; May 19, 1108; this *Bulletin*, 1952, v. 49, 892, 1069, 1146; 1954, v. 51, 719, 830]. One group responded to penicillin or vitamin B12, the other to folic acid. The response to penicillin was thought to be due to an improvement of vitamin B12 production by intestinal bacteria, intestinal changes favouring the absorption of haemopoietic substances, and possibly also due to a direct effect on the patients' metabolism.

This paper records measurement of vitamin B12 levels in the serum and vitamin B12 excretion in the faeces. The serum-B12 level was measured by determining the activation of growth of *Euglena gracilis*, and the excretion of the vitamin was followed by using a preparation labelled with radio-active cobalt (⁶⁰Co).

It was found that patients who responded to penicillin had at first low serum-B12 levels and that these rose on the administration of the antibiotic. Patients not responding to penicillin or to vitamin B12, but to folic acid, had normal serum-B12 levels to begin with. When radio-active B12 was administered to this second group, its excretion was only partial. This indicated that there was no deficiency of the intrinsic factor which is necessary for the absorption of the vitamin. H. Lehmann

McELFRESH, A. E., SHARPSTEEN, J. R. & AKABANE, T. **Secondary Hypersplenism occurring in a Seven-Month-Old Infant with Thalassemia Major.** *J. Pediatrics*. St. Louis. 1955, Sept., v. 47, No. 3, 347–50, 1 fig. [10 refs.]

“ 1. Secondary hypersplenism may occur in patients with Cooley's anemia at any age.

"2. Patients with this condition in whom hypersplenism can be proved will often benefit from splenectomy."

LÓPEZ FERNÁNDEZ, F. & GARCÍA OTERO, A. Hemoglobinopatía "S" (Anemia A Sickle Cell). Estudio electroforético de un caso y revisión de la literatura sobre las otras hemoglobinas anormales. [**Electrophoretic Study of a Case of Sickle-Cell Anaemia and Review of the Literature on Other Abnormal Haemoglobins**] *Sanidad y Beneficencia Municipal*. Habana, Cuba. 1954, June-Dec., v. 15, Nos. 3/4, 139-49, 1 fig. [37 refs.]

CLARKSON, E. M. & MAIZELS, M. **Sodium Transfer in the Erythrocytes of Sickle-Cell Anaemia.** *J. Physiology*. 1955, Sept. 28, v. 129, No. 3, 504-12. [11 refs.]

MINTZ, A. A., CHURCH, G. & ADAMS, E. D. **Cholelithiasis in Sickle Cell Anemia.** *J. Pediatrics*. St. Louis. 1955, Aug., v. 47, No. 2, 171-7, 4 figs.

"Two cases of cholelithiasis in patients with sickle cell anemia have been presented.

"Twenty patients in the pediatric age group with sickle cell anemia were examined with oral cholecystograms to determine the incidence of detectable biliary calculi. This technique was responsible for the diagnosis of cholelithiasis in two patients in this study.

"Review of the literature with respect to biliary calculi in the Negro in general and specifically in sickle cell anemia is included."

HAYS, Esther F. & ENGLE, R. L., Jr. **Sickle Cell-Hemoglobin C Disease.** *Ann. Intern. Med.* 1955, Aug., v. 43, No. 2, 412-18, 2 figs. [10 refs.]

"1. A case is reported of sickle cell-hemoglobin C disease in a 50 year old Negro male who has been essentially asymptomatic throughout life. Striking x-ray changes of the bones are demonstrated.

"2. Studies of the patient's family illustrate some aspects of the inheritance of the abnormal hemoglobins.

"3. A brief review is made of 19 cases of sickle cell-hemoglobin C disease reported in the literature."

VENOMS AND ANTIVENENES

GARB, S., SRIABINE, A., ROY, B. B., VENTURI, V. & PENNA, M., with the technical assistance of Ann WACKER. **A Protective Effect of a Carbon-Free Fraction of India Ink against Snake Venom.** *J. Lab. & Clin. Med.* 1955, Apr., v. 45, No. 4, 580-82.

"In a series of experiments on rats and mice it was found that some as yet unidentified substance in the carbon-free fraction of Higgins India ink affords a significant degree of protection against the lethal effects of both rattlesnake and cobra venoms when injected subcutaneously into the same area as the venom. Another brand of India ink did not protect. A number of known constituents of India ink were tested and also found to be ineffective. Some of the implications of these findings are discussed."

[See this *Bulletin*, 1939, v. 36, 857.]

PINTO, O. da S., LADEIRA, M. H., DE SOUZA, J. C. & BICALHO, J. C. Combate aos escorpiões em Belo Horizonte, Minas Gerais, com hexaclorociclohexana—Dados preliminares. [**Control of Scorpions in Belo Horizonte, Brazil, by means of BHC**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1954, Apr., v. 6, No. 2, 267-73, 1 graph.

The English summary appended to the paper is as follows:—

"1. To control the scorpion *Tityus serrulatus* in the city of Belo Horizonte, Minas Gerais, hexachlorocyclohexane was used as an emulsion sprayed in the interior of the houses, in the yards and external premises, as well as in vacant lots. It was demonstrated that the dose 500 milligrams of gamma-isomer per square meter was highly lethal for the scorpion.

"2. From October 18, 1951 to September 30, 1952, 67,479 houses and 94,700 yards vacant lots were sprayed, the work having been completed later.

"3. The preliminary results are judged satisfactory, in spite of the short time since the beginning of the work, that is now being completed.

"4. In a resurvey of the area, no scorpion was found.

"5. The number of accidents from bites by scorpions diminished markedly since February 1952, a fact that led the authors to forecast that the annual repetition of the spraying during a few years will completely eradicate the arachnids."

DE SOUZA, J. C., DE BUSTAMANTE, F. M. & BICALHO, J. C. Novos dados sobre o combate aos escorpiões em Belo Horizonte com o hexaclorociclohexana. [**New Observations on the Control of Scorpions in Belo Horizonte, Brazil, by means of BHC**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1954, July, v. 6, No. 3, 357-61, 1 graph.

The English summary appended to the paper is as follows:—

“The paper presents the general results of the campaign against the scorpions *Tityus serrulatus* carried out in Belo Horizonte by the Serviço Nacional de Malária, with the cooperation of the Health Department of the state of Minas Gerais. The first cycle of house spraying against scorpions was performed by means of BHC, from October 18, 1951 to December 31, 1953. With the doses of 500 mg. of the gamma isomer of hexachlorocyclohexane, 79,833 houses and about 80,000 back yards and vacant lots were sprayed.

“The results were excellent, the scorpions becoming scarce in the city after the sprays. From January to September, the number of cases of sting accidents fell from 741 in 1951 to 46 in 1953. The reduction in the number of accidents was progressively becoming more marked as the number of sprayed dwellings increased. During the trimester October–December of 1952, after a year of work, a reduction of 92.9 per cent was observed in relation to the correspondent period of the previous year. New sprayings are recommended to improve the results already obtained.”

KEEGAN, H. L. **Effectiveness of *Latrodectus tredecimguttatus* Antivenin in protecting Laboratory Mice against Effects of Intraperitoneal Injections of *Latrodectus mactans* Venom.** *Amer. J. Trop. Med. & Hyg.* 1955, July, v. 4, No. 4, 762–4.

Antivenene prepared in Yugoslavia (serum of sheep injected with the venom of *Latrodectus tredecimguttatus*) protected against lethal doses of venoms of *L. mactans* and *L. hasseltii*, obtained by extracting cephalothoraces of freshly killed adult female spiders. Venom was injected intraperitoneally into 20 gm. white mice. Antivenene was given by the same route 30 minutes later. “Death and survival were regarded as endpoints.”

B. G. Maeraith

TOXOPLASMOSIS

BALAZET, L. Enquête sérologique sur la toxoplasmose de l'homme et du chien dans la région d'Alger. [**Serological Investigation of Toxoplasmosis in Man and Dogs in the Algiers Area**] *Arch. Inst. Pasteur d'Algérie.* 1955, June, v. 33, No. 2, 78–83. [24 refs.]

The sera from 125 persons and 105 dogs were examined for evidence of toxoplasmosis by the complement-fixation test with the use of the Westphal antigen. About 10 per cent. of the human sera were positive and more than 30 per cent. of the canine sera. It is considered that the

dog may be a reservoir from which man is infected, but the precise pathway of infection remains unknown.

[The possibility that man may infect the dog is not discussed.]

I. A. B. Cathie

WEIGAND, W. Kritische Betrachtungen zum *Toxoplasma*-Antigen nach Westphal. [**Critical Observations on the Westphal *Toxoplasma* Antigen**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1955, July, v. 112, No. 3, 220-27. [11 refs.]

The antigen generally used for the toxoplasma complement-fixation test is prepared from the chorio-allantoic membrane of the chick embryo. WESTPHAL [this *Bulletin*, 1952, v. 49, 320, 905] has developed an antigen prepared by irradiating guineapig peritoneal exudate. Some of the results published from Germany with the use of the Westphal antigen have been at such variance with those obtained elsewhere with the egg antigen, that doubts have been cast on the specificity of the Westphal antigen. To investigate this question the author examined sera with the Westphal antigen, controlling the findings with egg antigen obtained from Dr. Siim of Copenhagen. A good correlation was found between the two antigens, and the author concludes that the Westphal antigen is as reliable as the egg antigen. Further technical investigations are included, among which it was found that inactivation of the test serum for half an hour was better than inactivation for 16 hours.

[In spite of the good correlation reported with the two antigens, the relatively high number of sera giving a positive result with the Westphal antigen but a negative result with the dye test of Sabin and Feldman remains to be explained.]

I. A. B. Cathie

BOGACZ, J. Action comparée sur les toxoplasmes de diverses substances synthétiques et de quelques antibiotiques dont la spiramycine. [**Comparison of the Action on Toxoplasms of Various Synthetic Substances and Some Antibiotics including Spiramycin**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 6, 903-13.

These experiments were done with a single strain of *Toxoplasma* isolated in Oubangui, French Equatorial Africa. Rabbits and mice were inoculated intraperitoneally with a suspension of infected mouse brain, and drugs were administered in most cases subcutaneously, twice a day for 10 days. Results were judged by length of survival, the presence and extent of lesions, and by the presence or absence of the organism in the peritoneal cavity and elsewhere. In a few experiments treatment was delayed, and those in mice were complicated by the alternative use of peritoneal exudate as inoculum, which apparently produced an infection less amenable to treatment.

The infection in rabbits was more amenable to treatment than that in

mice, owing to their greater natural resistance. Different doses of some of the drugs were used, some being very large (200, 400 and even 800 mgm. per kgm. per day). It is difficult to place the drugs in an order of merit on the basis of the data presented, but it seems that sulphadiazine and sulphamerazine used together (100 mgm. per kgm. of each daily) were fully effective: 3 other synthetic products were without effect. Among antibiotics the most effective appears to have been terramycin (oxytetracycline): spiramycin also gave prolonged survival and absence of organisms from the peritoneal fluid if given in doses of 300 or 400 mgm. per kgm. daily. Ilotycin (erythromycin) and magnamycin (carbomycin) appear to have been decidedly less effective. Spiramycin is said to have been better tolerated than oxytetracycline in the larger doses used. [See also this *Bulletin*, 1955, v. 52, 85, 932.]

L. P. Garrod

TROPICAL OPHTHALMOLOGY

CONDE, H. de B. Considerações sobre a epidemiologia e a profilaxia do tracoma no Brasil. [**Observations on the Epidemiology and Prevention of Trachoma in Brazil**] *Rev. Internat. du Trachome*. 1955, v. 32, No. 3, 370-91, 2 maps. [Numerous refs.]

The English summary appended to the paper is as follows:—

“As in other countries, immigration of infected strangers is considered to be the cause of the development of trachoma in Brazil. Quarantine exists now, but it has not always been so.

“In 1948 a Federal Campaign against trachoma has been carried out and since the Health Department has endeavoured to reinforce it.

“There are three principal foci of trachomatous endemicity: the state of Ceara, others in the state of Sao Paulo and or Rio Grande Do Sul and the neighbouring areas. Against trachoma 342 units have been created, including those of the state of Sao Paulo which is independent since 1904. Moreover epidemiological inquiries directed by the Sanitary Organization of the National Health Department have been carried out in several areas.

“Exemplar units have been settled at Jacarezinho (Parana) and at Crato (Ceara), a trachoma Hospital established at Londrina and a center for immigrants.

“Sulfonamide tablets and antibiotics (aureomycin and terramycin) ointments distributed and satisfactory results noted.

“Epidemiology of trachoma in Brazil shows particularities owing to the different latitudes and the standard of life. Special sanitary organizations have been created for agricultural workers (public baths in the coffee plants, for example). Post-graduate specialization for doctors has been organized by the National Health Department.

"A prize has been awarded at the Scientific Session of the 2nd Pan American Congress of Ophthalmology, (Montevideo, Dec. 1945), for the general scheme of this Campaign against trachoma."

TROPICAL ULCER

CASELITZ, F. H. Mikrobiologische Studien am Ulcus tropicum. [**Microbiological Studies on Tropical Ulcer**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, June, v. 6, No. 2, 230-34. [21 refs.]

The bacteriological findings in 154 cases of tropical ulcer of the leg (and one of the big toe) are given. Smears from the lesions showed that 40 per cent. contained either fusiform bacilli or spirochaetes or both, with and without other organisms. No organisms were found in 26.4 per cent., and organisms but no fusiform bacilli or spirochaetes in the remainder. Culture in thioglycolate cooked meat broth revealed organisms in 78.6 per cent. *Staph. aureus*, *Proteus* and β -haemolytic *Streptococcus* were the commonest. Pure cultures (*Proteus* the most common) were obtained in 59.5 per cent.

The author concludes that there are several bacteriological stages of tropical ulcer in Jamaica. In the early stages fusiform bacilli and spirochaetes predominate. These are later overgrown by other organisms which may appear with them but later replace them. In the final stages only secondary organisms may be present or none at all.

Bacteriological examination of ulcers is important for choice of chemotherapy.

B. G. Maegraith

MANCA, G. L'emploi des hémostatiques dans le traitement des ulcères tropicaux. [**The Use of Haemostatics in the Treatment of Tropical Ulcers**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 2, 210-14.

The author uses a sterile lipocolloidal thromboplastic substance Cytozyme [Laboratoires Robert et Carrière, Paris] in the local treatment of tropical ulcers. In advanced cases the application is preceded for 3 days by soaking the ulcer in a solution of potassium permanganate, followed on the fourth day by curettage and the immediate application of 5 ml. of the haemostatic solution. The lesion is then covered with gauze. After 5 or 6 days the gauze is removed and a further application is made. This treatment has been found to shorten the stay in hospital to 15-20 days and thus to be economical. Notes are given of 13 cases of tropical ulcer treated in this way.

Frederick J. Wright

MISCELLANEOUS DISEASES

GELFAND, M. **Bantu Siderosis.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, July, v. 49, No. 4, 370-75.

Haemochromatosis, a disorder of iron metabolism, is characterized by deposit of haemosiderin, containing iron, and of haemofuscin, which does not contain iron, in the skin and certain viscera; later by fibrosis of the liver and pancreas; and finally by diabetes mellitus and sometimes sexual hypoplasia. This chronic progressive condition occurs chiefly in males. The addition of potassium ferrocyanide and hydrochloric acid to tissues containing haemosiderin produces blue ferric-ferrocyanide; this is the basis of the Perl, or Prussian blue, test. Chemical analysis of the pancreas, liver, thyroid and heart in cases of haemochromatosis shows them to contain at least 10 times the normal iron content; the spleen, lungs and small intestine have less than five times the normal iron content; and the blood contains a normal or subnormal amount of iron.

Among other conditions causing a positive Perl reaction is haemosiderosis. This may result from multiple blood transfusions, from intravenous iron injections, from excessive red cell destruction due to a haemolytic anaemia, or from starvation. Haemosiderosis commonly is found post mortem in the organs and tissues of Bantu. The siderosis of Bantu is unlike that of haemochromatosis because the iron-containing pigment is differently located, suggesting its storage in the liver and reticulo-endothelial system; for example its concentration is greater in the spleen than in the liver. In this condition the iron is said not to be found in the pancreas or thyroid, but it has been reported to be present in massive amounts in the jejunum and duodenal mucosa [this *Bulletin*, 1954, v. 51, 224]. Fibrosis is unusual in, and diabetes mellitus is not an accompaniment of, Bantu siderosis. Various theories have been advanced in explanation of this condition; WALKER and ARVIDSSON [this *Bulletin*, 1954, v. 51, 300] believe that their findings show that it is due to excessive iron intake by the Bantu, and they do not think its existence is detrimental to health.

The author, in the course of autopsies on 75 African adults and 30 children under 5 years of age dying from various causes in Salisbury, S. Rhodesia, systematically examined organs for the presence of ferric iron by the Perl test. Judged by this test 49 (65 per cent.) of the adults and 18 of the children had siderosis; 3 of the children were stillborn, but one of these had siderosis; 2 children with kwashiorkor gave positive reactions. Siderosis, as determined microscopically, is therefore common in Central Africa. The livers and spleens contained much ferric iron; the pancreas, suprarenals, the heart and the small intestine did so much less commonly. There was no evidence of pathological ill-effect of the condition, which was not associated with nutritional disorders. The author's findings broadly support those of HIGGINSON *et al.* [*ibid.*, 1954,

v. 51, 244] as to the location of the pigment deposits; but the high incidence of siderosis in infants and the absence of iron pigment from the jejunum in his series of cases suggest to him that some factor other than a high iron dietary intake is the cause of Bantu siderosis. Schistosomiasis, and to a lesser extent hookworm disease, both well known causes of blood loss from bleeding, are extremely common in Central Africa where he has found siderosis commonly to occur. *A. R. D. Adams*

STUART, K. L., JELLIFFE, D. B. & HILL, K. R. **Acute Toxic Hypoglycaemia occurring in the Vomiting Sickness of Jamaica (Clinical Aspects).** *J. Trop. Pediatrics*. London. 1955, Sept., v. 1, No. 2, 69-87, 6 figs. [22 refs.]

The authors describe in detail 9 cases of vomiting sickness in Jamaicans, 7 in children and 2 in young women. In those cases in which blood sugar studies were made, there was severe hypoglycaemia (3 to 22 mgm. per cent.). In patients seen early after onset, intravenous administration of glucose was beneficial.

The aetiology of the condition is discussed. It is suggested that it results from poisoning, possibly from eating immature ackee and bush teas. The hypoglycaemia may arise from reversible blocking of enzymes whereby gluconeogenesis is inhibited. The mechanism of the hypoglycaemia is discussed at length, with reference to the literature. Reference is made to the work of HASSALL *et al.* [this *Bulletin*, 1955, v. 52, 691] who isolated the polypeptides hypoglycin A and B from the seed of the fruit. [See also *ibid.*, 1954, v. 51, 113, 432; 1955, v. 52, 91.]

B. G. Macgraith

PATRICK, S. J., JELLIFFE, D. B. & STUART, K. L. **The Hepatic Glycogen Content in Acute Toxic Hypoglycaemia.** *J. Trop. Pediatrics*. London. 1955, Sept., v. 1, No. 2, 88-9.

Liver glycogen was assayed in biopsies from 4 cases of vomiting sickness. Percentages (wet weight) were 0.2, 0.2, 0.4 and 0.7 respectively. Normal content is 5 to 10 per cent. Liver biopsy specimens from undernourished children contained 3 to 10 per cent.

It is suggested that there was inhibition of glyconeogenesis in these cases. In two, blood sugar response to cutaneous adrenaline was absent in the hypoglycaemic phase.

B. G. Macgraith

GALLAIS, P., PIGANIOU, G., HERVÉ, A. & DARCOURT, G. Un cas de myosite chronique à forme paralytique. [**A Case of Chronic Myositis of a Paralytic Type**] *Méd. Trop.* Marseilles. 1955, Mar.-Apr., v. 15, No. 2, 229-31.

PARASITOLOGY : GENERAL

FROTA, M. A enteroparasitose humana e sua prevalência no Sul de Minas Gerais. Estudos estatísticos baseados em 13,000 exames de fezes, compreendendo um período de 20 anos. [**Statistical Study of the Prevalence of Human Enteroparasites in the Southern Part of the State of Minas Gerais based on the Examination of 13,000 Faecal Samples carried out over a Period of 20 Years**] *Rev. Méd. Sul de Minas*. 1955, Jan., v. 1, No. 1, 40–75, 13 figs. [80 refs.] English summary.

This is a summary of the findings in 13,000 examinations of faecal samples collected during a period of 20 years from people living in the 36 counties of the southern part of the State of Minas Gerais. The total area of the region concerned is 17,968 square kilometres of which the population is 407,500. A short account is given of its physiography and climate.

Intestinal parasites, protozoal, metazoal or both, were found in 72·5 per cent. of the samples examined. The most prevalent protozoa, of which 11 species were identified, were *Entamoeba histolytica* 27·7, *E. coli* 13, *Endolimax nana* 12·2, *Trichomonas hominis* 8·4, *Giardia intestinalis* 7·5 and *Chilomastix mesnili* 4·6 per cent. of samples examined. Of the 10 metazoa identified the most prevalent were *Ascaris lumbricoides* 13, *Necator americanus* and *Ancylostoma duodenale* 11, *Strongyloides stercoralis* 4, *Trichuris trichiura* 4, *Taenia saginata* or *solium* 1·1, and *Enterobius vermicularis* 1 per cent. of specimens examined. Somewhat lengthy notes of each species follow the tables. Uncommon parasites receive special attention with numerous bibliographical references.

Norman White

ENTOMOLOGY AND INSECTICIDES : GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

DAY, M. F. **Mechanisms of Transmission of Viruses by Arthropods.** *Exper. Parasit.* New York. 1955, July, v. 4, No. 4, 387–418, 3 figs. [Numerous refs.]

This is a useful corollary to an earlier mimeographed review of problems of specificity in arthropod vectors of plants and animal viruses compiled by the author with BENNETTS [this *Bulletin*, 1955, v. 52, 837]. The mechanisms of transmission of arthropod-borne viruses are exemplified by selected cases from the medically-important animal viruses and their

vectors and from the viruses of agricultural interest. The general line of treatment is to summarize the established facts, discuss equivocal evidence for various points, and come to a conclusion, firm or tentative, as to the fate of virus in a vector and its mode of transmission to the animal or plant host. The infections selected for consideration in this way are rabbit myxomatosis and other pox viruses, yellow fever, dengue, and the viral encephalitides. The last group again come into the argument when dealing with various viruses (loupings ill, Nairobi sheep disease, Colorado tick fever, Russian spring-summer encephalitis) and their transmission by acarines. It is thought, as regards the encephalitis viruses, that the controversial subject of the rôle of mites in the epidemiology of these infections deserves the benefit of further researches; findings for rickettsial infections borne by ticks might usefully be studied in this connexion, particularly the phenomenon of "reactivation" of rickettsiae in ticks [this *Bulletin*, 1923, v. 20, 808] by a blood-meal or temperature raised to 37°C. for 48 hours.

It is remarkable how commonly the acarines are associated with transovarial inheritance of the animal viruses they transmit while this is not known for insect-borne viruses of animals. It is interesting, however, that some insects (leafhoppers) which are vectors of plant viruses transmit transovarially.

More than half the paper is given over to discussion of the mechanisms of transmission of plant viruses by, chiefly, aphids and leafhoppers. Within this group, biological transmission, as in mosquitoes and yellow fever, is the rule for leafhoppers which transmit a number of plant viruses, and for some aphids too. But aphid-borne viruses may be grouped into non-persistent and persistent viruses, the terms referring to the persistence of virus in aphids after the insect feeds on an infected plant. Persistent viruses, the least common type in aphid transmission, are comparable in their biological course in the aphid to the animal viruses such as yellow fever in mosquitoes. Multiplication may or may not happen in the aphid. Non-persistent viruses approximate to those with the mechanical type of transmission known for myxomatosis and other mosquito-borne pox viruses of animals. Acquisition of the virus by the aphid and its subsequent transmission may happen within less than a minute but the persistence of virus in the insect is influenced by various factors including the duration of the infecting meal and starvation before or after this meal. It is thought that a partial inactivating effect of salivary fluid on virus contaminating the stylets of the aphid may be a significant factor. This plausible hypothesis was referred to in an earlier paper as modified mechanical transmission, since it involved more than the progressive mechanical removal of virus particles from the stylets with each successive feed, the type of simple mechanical transmission reported for mosquito transmission of myxomatosis. Those interested in mechanical transmission of animal viruses may find this review of the subject for aphid-borne plant viruses of instructive interest.

There are some notes on plant virus transmission by other kinds of insects, on rickettsial infections in lice, and animal viruses transmitted by diptera other than mosquitoes. The illustrations are diagrammatic sagittal sections of an aphid, mosquito and tick.

D. S. Bertram

MARIANI, M. & BOSCARINO, A. Prima segnalazione di "*Myzomyia hispaniola*" Theobald in Sicilia. [**First Record of *Myzomyia hispaniola* in Sicily**] *Riv. di Malariologia*. 1955, June, v. 34, Nos. 1/3, 49-55, 4 figs. English summary (7 lines).

ABONNENC, E. Sur un anophèle cavernicole de la Guinée: *Anopheles cavernicolus* n.sp. (Diptera-Culicidae). [*Anopheles cavernicolus* in **Guinea, French West Africa**] *Bull. et Mém. École Préparatoire Méd., Pharm. de Dakar*. 1954, v. 2, 288-90, 2 figs.

LAIRD, M. **Notes on the Mosquitos of the Gilbert, Ellice and Tokelau Islands, and on Filariasis in the Latter Group.** *Bull. Entom. Res.* 1955, Aug., v. 46, Pt. 2, 291-300, 1 fig. [17 refs.]

After reviewing the literature and discarding unsubstantial records the author concludes that the mosquitoes already known from these Pacific islands are: on the Tokelau islands, *Aedes polynesiensis* only; on the Gilberts, *A. aegypti*, *A. marshallensis* and *Culex fatigans*; on the Ellice group, *Aedes aegypti*, *A. polynesiensis*, *A. vexans* and *Culex annulirostris*.

After visiting the islands in 1953 and 1954 the author was able to confirm the above list and to say that the form of *Aedes vexans* present was the subspecies *nocturnus*. He was also able to add, for the Gilberts, *Aedes vexans nocturnus* and *Culex annulirostris*.

On Nukunono of the Tokelau group blood samples were taken from 97 people in the evening. The microfilaria rate was thus shown to be much higher in males than in females indicating a ratio of 3 to 1, which seems related to the fact that from an early age males spend a great deal of their time in the coconut plantations where *Aedes polynesiensis* is usually more abundant than in the villages.

H. S. Leeson

PEYTON, E. L., GALINDO, P. & BLANTON, F. S. **Pictorial Keys to the Genera of Panama Mosquitoes.** *Mosquito News*. 1955, June, v. 15, No. 2, 95-100, 4 pp. of figs. [13 refs.]

The paper provides keys to adult females and larvae of the 17 genera of mosquitoes known to occur in Panama. Every point of distinction mentioned in the keys is very clearly shown in the line drawings, which are excellent: among other points they show clearly such features as pre-alar setae, not easy for a beginner to find.

P. A. Buxton

HARPER, J. O. **The Breeding Place of *Aedes* “*Stegomyia*” *woodi* Edwards.** *East African Med. J.* 1955, Aug., v. 32, No. 8, 331-2.

THOMPSON, R. P. & BROWN, A. W. A. **The Attractiveness of Human Sweat to Mosquitoes and the Role of Carbon Dioxide.** *Mosquito News.* 1955, June, v. 15, No. 2, 80-84. [11 refs.]

Field work has shown that clothing soaked with sweat attracts almost twice as many mosquitoes (Arctic *Aedes*) as equally moist clean clothing [this *Bulletin*, 1952, v. 49, 196, 323]. The authors here describe cage experiments, on *Aedes aegypti*, two streams of air being offered, the one containing water vapour, the other containing vapour from filter paper wet with sweat from armpit or forehead. The conclusion is that sweat from the armpit is significantly attractive, that from the forehead not: both are a mixture of sudor and sebum, that from the armpit containing a higher proportion of sebum, which is clinically the more complicated, containing lower fatty acids, certain esters, cholesterol, etc. The addition of carbon dioxide or its removal did not alter the attractiveness of armpit sweat.

P. A. Buxton

MOOREFIELD, H. H. & KEARNS, C. W. **Mechanism of Action of certain Synergists for DDT against Resistant House Flies.** *J. Econom. Entom.* 1955, Aug., v. 48, No. 4, 403-6. [11 refs.]

DDT-resistant house-flies are known to be able to degrade DDT to an innocuous compound DDE by means of an enzyme “dehydrochlorinase”. Certain compounds structurally related to DDT can act as synergists for this insecticide against resistant house-flies, apparently by interfering by the detoxifying mechanism (PERRY *et al.*, *Biol. Bull.*, 1953, v. 104, 426).

The authors have further investigated this question by studying the inhibitory action of some of these compounds, *in vitro*, on dehydrochlorinase extracted from house-flies. Nine analogues of DDT were examined. Three were ineffective as synergists and had no inhibitory action on dehydrochlorinase. The authors believe that lack of effect in two of these cases can be explained by absence of *para* chlorine atoms, which seem essential for activity.

The other 6 compounds all inhibit dehydrochlorinase and all are active DDT synergists against resistant flies. The correlation is not exact, which is only to be expected, since several extraneous factors (such as relative water solubility) will affect action *in vivo* differently from experiments *in vitro*.

The measurements of the dehydrochlorination inhibition at different concentrations suggest that 3 of the active synergists act as competitive enzyme inhibitors; their action is largely reversible. The other 3 compounds show high action over a wide range of concentrations; their actions are irreversible, and not at present understood.

MARCH *et al.* [this *Bulletin*, 1953, v. 50, 463] have shown that resistant house-flies selected by the action of a DDT plus synergist combination, eventually become resistant to the mixture. The authors have examined 2 such strains and have shown that they have developed more dehydrochlorinase than ordinary DDT-resistant flies. They suggest that this increased development of enzyme explains the immunity to the DDT-synergist combination.

J. R. Busvine

GRANETT, P. & HAYNES, H. L. **Use of Cyclothrin in Livestock Sprays for Control of Flies.** *J. Econom. Entom.* 1955, Aug., v. 48, No. 4, 409-12.

"Cyclothrin, a new synthetic pyrethrin-type insecticide, has been tried against horn flies and stable flies on dairy cattle. Synergized with piperonyl butoxide or sulfoxide in an oil base spray used at the rate of approximately 2 ounces per animal, it was found that 1.5 to 2 times as much cyclothrin is needed as pyrethrins, to provide effective repellency on the day sprayed. When water emulsion sprays were used and 1 quart of the diluted concentrate was applied per animal, effective repellency was obtained for 3 to 5 days from concentrations equivalent to pyrethrin formulations. Part of the toxicant in the spray could be replaced with butoxy polypropylene glycol, generally with an increase in the effective protection period."

GERSDORFF, W. A. & PIQUETT, P. G. **A Comparison of Cyclothrin, Allethrin, Pyrethrins, and Mixtures of Piperonyl Butoxide or Sulfoxide with them in House Fly Sprays.** *J. Econom. Entom.* 1955, Aug., v. 48, No. 4, 407-9.

"A comparison of cyclothrin, allethrin, pyrethrins, and mixtures of piperonyl butoxide or sulfoxide with them was made in space sprays against the house fly, *Musca domestica* L., by the turntable method.

"Cyclothrin was 0.60 as toxic as allethrin and 1.5 as toxic as pyrethrins.

"In mixtures of 1 part of insecticide to 10 parts of synergist, piperonyl butoxide and sulfoxide synergized cyclothrin equally and more strongly than they did allethrin. Sulfoxide synergized pyrethrins more strongly than it did cyclothrin.

"On the basis of insecticide equivalent, the mixtures of the synergists with cyclothrin, allethrin, and pyrethrins were about $8\frac{1}{2}$, 3, and 20 times as toxic as the corresponding insecticides alone, and about $12\frac{1}{2}$, 8, and 20 times as toxic as pyrethrins alone. On the basis of actual insecticide content, the respective mixtures were 10, $3\frac{1}{2}$, and 24 times as effective as the corresponding insecticides alone and 14, $8\frac{1}{2}$, and 24 times as effective as pyrethrins alone.

" In sprays containing the insecticide alone cyathrin was slightly less effective than allethrin in knockdown of flies in 25 minutes.

" At comparable concentrations cyathrin mixtures with either synergist were slightly more effective than the allethrin mixtures in knockdown in 25 minutes."

KILPATRICK, J. W. **The Control of Rural Fly Populations in South-Eastern Georgia with Parathion-Impregnated Cords.** *Amer. J. Trop. Med. & Hyg.* 1955, July, v. 4, No. 4, 758-61, 3 figs. [10 refs.]

Cotton cords, 3/16" and 3/32" diameter, were impregnated with parathion, by means of a specially designed apparatus which gave dosages of, respectively, 350 mgm. and 125 mgm. parathion per linear foot of cord. Pieces of cord were suspended in 12 to 20 buildings (barns, pig-pens, chicken houses, kitchens, porches) in each of two rural areas, one area for each type of cord; a third area was selected for control observations. Treatment rates were calculated in linear feet of cord per 100 square feet of floor, or ceiling. Estimates of house-fly density were made by sampling by the grill method. Each treated area was approximately 6 square miles.

The cords were suspended in late April. There was an immediate reduction of flies in the area where the lightly impregnated cords were suspended. Failure to obtain this drop where 3/16" cords were in use was traced to extremely high counts at two check points and, after cords were sited in pig shelters and other premises nearby, a rapid fall in fly counts for this area was then obtained. In the first of these areas the reduced density lasted about 2 months, after which the density differed little from the fly density in the untreated control area. In the other area, in which the heavily impregnated thicker cords were on trial, the reduction once obtained persisted for the rest of the fly season, that is, until early October. Most striking results were seen in sampling kitchens of unscreened houses in each treated area and the control area, there being substantially greater numbers of flies in the kitchens of the control area. It is concluded that the suspension of parathion-impregnated cords in premises throughout a rural area is a promising control measure against house-flies. The cost is approximately equal to residual DDT treatments and fly-resistance to parathion is not yet shown to be an imminent possibility.

D. S. Bertram

KAMO, H., EGASHIRA, M. & ISHII, Y. **On the Trombiculid Mites in Kyushu.** *Kyushu Mem. Med. Sci.* Fukuoka. 1955, Mar., v. 5, Nos. 3/4, 207-15, 1 fig. [16 refs.]

This paper reports the results of collections made at 44 localities on Kyushu Island, Japan, over a 3-year period. A total of 27 species are noted, bringing the total recorded from the island to 34 in all.

Over 300 host animals were examined, comprising 8 named species of rodents and 13 species of birds (unnamed). The most important host animal numerically is *Apodemus speciosus*.

Brief notes are given on the occurrence of the different mite species. Their distribution on the island is summarized on an outline map. The seasonal abundance of the mites is not discussed, except that it is noted that specimens of only 3 species were collected during the summer months, from two islands off the coast of the mainland. *D. M. Minter*

CARTER, W. I. **A Case of Human Parasitization by *Ixodes hexagonus*, Leach (Hedgehog Tick).** [Memoranda.] *Brit. Med. J.* 1955, Oct. 22, 1012.

WINTERINGHAM, F. P. W. & BARNES, J. M. **Comparative Response of Insects and Mammals to certain Halogenated Hydrocarbons used as Insecticides.** *Physiol. Rev.* 1955, July, v. 35, No. 3, 701-39. [335 refs.]

This paper brings together from nearly 400 references a substantial body of information about the toxicity of certain halogen-containing insecticides for insects, man and other mammals. It is particularly concerned to deal with the physiological and biochemical basis of their poisonous action. The insecticides selected are methyl bromide, ethylene dibromide, ethylene dichloride, *o*- and *p*-dichlorobenzene, DDT and its analogues, the gamma isomer of hexachlorocyclohexane (HCH)—more readily recognized as gamma BHC (Gammexane, Lindane) to readers of this *Bulletin*—aldrin, dieldrin, and chlordane. Each is dealt with under a series of sectional headings which give some indication of the range of fact provided in the review: absorption, signs of poisoning, physiological effects, biochemical effects, metabolic fate, and modes of toxic action.

In brief concluding comments it is observed that insects and mammals respond in a very similar way to any of these compounds at comparable tissue concentrations. Despite the manifest differences in the anatomy and physiology of insects and mammals, the basic cellular metabolic processes seem substantially the same, and the similarity of action of insecticides on these two animal groups suggests that they interfere with these basic cellular processes. Possibly, this concerns enzyme systems or, as in the case of DDT, perhaps more a modification of cell membranes and their permeability.

Differences in the sensitivity of insects and mammals to the insecticides seem to depend on the ease and speed with which toxic amounts of the compound reach the site of action. Among mammals tested, the range of sensitivity is not very great but among insects sensitivity varies profoundly. This, it is thought, signifies that the insecticides fail to reach the sites of toxic action in adequate concentration rather than that the

apparently insensitive insect species have fundamentally different basic metabolic processes at cell level. Cellular respiratory mechanisms may be the critical metabolic phenomena concerned in toxicity. If these sensitive and basic biochemical mechanisms are so universal then selective toxicity would depend, as it has in practice, on structural and habit differences between organisms and not on intrinsic differences at the biochemical level. Truly selective toxic substances, by this argument, could hardly be conceived.

The review well deserves study in the original. It is hardly possible to make a satisfactory abstract of the condensed detail which it presents.

D. S. Bertram

DAVIDSON, G. **The Principles and Practice of the Use of Residual Contact Insecticides for the Control of Insects of Medical Importance.**

J. Trop. Med. & Hyg. 1955, Mar. & Apr., v. 58, Nos. 3 & 4, 49-56; 73-80. [12 refs.]

The author of this paper is an entomologist with wide experience of the practical use in the field of residual contact insecticides; he commenced this work in 1945 when information on field application was meagre. At that time the first of the insecticides, DDT and BHC, were often applied in a haphazard manner with conflicting results. With the passage of time the importance of the relation between the physical form of these insecticides and their toxicity to insects has become increasingly evident. This paper attempts to explain this relation in some detail and indicates the ways in which these insecticides should be used to control the principal insect pests of medical importance in the most efficient and economical way at the present time. The paper, therefore, is of distinct value to doctors and other public health workers working in the tropics.

The various formulations of DDT, BHC and dieldrin and their fate on different types of surfaces are described. The advantages and disadvantages of the various types of apparatus available for the application of the insecticides are briefly referred to, and the means of estimating the quantities of the different formulations required to make one gallon of spray mixture, which on application would result in the desired residual dosage on the surface treated, is explained. The author draws attention to the necessity for adequate and reliable supervision of a small, manageable team, the members of which should be recognized and treated as skilled labourers. Figures are given for the amount of work per day which can be expected of such a team.

Apart from residual spraying of buildings other methods of dispersion of residual insecticides are described, *e.g.*, dust, aerosol, fog, smoke, insecticide pellets or granules, oil larvicides and the incorporation of insecticides in whitewashes, distempers, paints and resins; the apparatus involved is also briefly referred to.

In the second half of the paper methods of control of specific insect pests of medical importance are detailed; insects include mosquitoes, house-flies, bed bugs, fleas, sandflies, ticks, lice, cockroaches, mites, biting midges, blackflies and tsetse flies.

While a great deal can be written on this subject this paper contains all the essential information for practical work in the field with which the doctor in practice in the tropics should be familiar. *R. Ford Tredre*

SRIVASTAVA, R. S., CHAKRABARTI, A. K. & SINGH, N. N. **Study of Chemical and Photodynamic Deterioration of Dichloro-Diphenyl-Trichlorethane (D.D.T.) when applied on Solid Surfaces.** *Indian J. Malariology*. 1955, Mar., v. 9, No. 1, 27-32.

REPORTS AND SURVEYS

ISTANBUL. **International Congresses of Tropical Medicine and Malaria, 28.8-4.9. 1953. Vol. I. Reports.** 201 pp. 1953. **Vol. 2. Communications.** 646 pp., numerous figs. 1954. Istanbul: Imprimerie Çelikkilt.

This congress was held in Istanbul in August and September 1953, and the proceedings have been printed and issued in two volumes. The first volume contains, in its first section, the 4 main papers on malaria:— on parasitology by M. K. AFRIDI, on vector control by A. GABALDÓN, on pathology and pathogenesis by B. G. MAEGRAITH, and on chemotherapy by A. NOYAN. Much of the work discussed in these has been described before, but they are valuable in that they summarize current information and in that the authors are well equipped to evaluate the subjects.

This section is followed by a series of similar papers on tropical diseases other than malaria:— on schistosomiasis by G. H. P. FROES, filariasis by J. RODHAIN and M. WANSON, protein malnutrition by B. S. PLATT, trypanosomiasis by M. VAUCÉL and H. JONCHÈRE, virus diseases by P. LÉPINE, and American trypanosomiasis by C. ROMANA.

The second volume is much larger, and contains the communications submitted to the Congress, and the discussions relating to these communications and to the papers printed in the first volume. It is quite impossible to mention all these communications, which occupy 646 pages, even by title. The malaria section contains some, such as those by W. H. H. ANDREWS and G. MOUSTARDIER, which link closely with the main papers (in these instances with the paper by Maegraith) and it is perhaps unfortunate that they are published in the second volume, away from the main communications to which they refer. (It is also regrettable

that there is no detailed table of contents or index. It is not possible to find any particular paper, or to know the names of those who read papers, except by searching laboriously through the whole publication.) The malaria section comprises a wide range of subjects—parasitology, treatment, control, and malaria of animals, and the papers range from accounts of individual cases to broad generalizations. It is disconcerting, however, to meet one on leptospirosis (p. 271) within the malaria section, and suddenly to find the discussion on malaria running on without break to a discussion on schistosomiasis (p. 282), though the main section on schistosomiasis begins 10 pages later, and goes on for about 170 pages. This section contains a paper by J. SCHWETZ entitled “*Ou en est-on avec la classification-nomenclature des mollusques centro-africains transmetteurs des bilharzioses humaines et animales?*”, and the reader can only answer “where indeed?”.

The section on nutrition occupies about 100 pages, and includes not only papers on protein requirements, but also one on contamination of food in Egypt, and one on anaemias of the tropics by H. Foy and A. KONDI. The section on filariasis (of about 60 pages) is much occupied by papers on periodicity, clinical effects and treatment. The section on trypanosomiasis is limited to the South American type.

These volumes appear to be the official records of this important Congress, and although one must congratulate the Turkish authorities on producing these extensive accounts, printed in English, French or German, with reasonable accuracy, one must also protest that because of the simple omission of a complete table of contents and an author index, the volumes cannot be regarded as useful contributions to the literature. The papers themselves are mostly good and useful, but they are lost for want of good editing.

Charles Wilcocks

BOOK REVIEWS

TIDY, Henry [K.B.E., M.A., M.D., F.R.C.P.] & WALKER, R. Milnes [M.S., F.R.C.S.]. [Editors.] **The Medical Annual. A Year Book of Treatment and Practitioners' Index.** pp. xlv + 548, 63 pls. & 58 figs. 1955. 73rd Year. Bristol, 4: John Wright & Sons Ltd., The Stonebridge Press, Bath Road. Toronto: The Macmillan Co. of Canada Ltd. [32s. 6d.]

The Medical Annual is a collection of summaries of recent work on various medical conditions. It is issued each year, and the contributors who write for it are well known for their work on subjects with which they deal. The summaries are set out in alphabetical order of the subjects, and in this 1955 edition the first article is on abdominal surgery in children, and the last is on yellow fever.

The summaries are not intended to give the reader a full account of modern views on the various subjects, but they record recent work, thus bringing the reader up to date. Although *The Medical Annual* can be read as a continuation of existing textbooks, there is likely to be a gap between the older books and the most recent issues of the *Annual*. To get the full benefit of this publication, therefore, a whole series, year after year, should be consulted.

The alphabetical arrangement has certain disadvantages in that subjects are often separated from others of similar interest. A fairly comprehensive index, however, allows one to find the various sections with the minimum of trouble, and gives a cohesion lacking in the alphabetical arrangement. Nevertheless, one cannot help thinking that a more standard method of arranging the information might be more useful, perhaps according to the broad divisions of subjects—surgery, tropical medicine and so on. An instance in the present volume of the unfortunate effects of this alphabetical arrangement is the fact that the section on helminthiasis does not contain the summaries on schistosomiasis or guineaworm. Filariasis is not mentioned, nor is trypanosomiasis.

The main interest of the volume is in clinical medicine, and readers in the tropics will benefit greatly from the very large amount of condensed information on subjects other than tropical diseases which the book contains. Particular mention may be made of the summaries of the infectious diseases, tuberculosis, and the various venereal diseases. The accounts of poliomyelitis and epidemic haemorrhagic fever are also notable.

Readers abroad will no doubt be interested in the list of English and American medical books and new editions which have been published during the preceding year and which are noticed, in an appendix, by title in which the details of authorship, publishers and price are given.

Finally, it may be observed that the information included in *The Medical Annual* is very largely drawn from British and American literature. One criticism might, therefore, be that a little more attention should be paid in future to other foreign literature. But when this is said, it remains true that *The Medical Annual* is a notable annual event in medical publishing.

Charles Wilcocks

SCOTT, Josephine [S.R.N., S.C.M., S.R.M.N.]. **Illustrated Practical Nursing Procedures for Hospital Assistants.** Published in association with the Northern Rhodesia and Nyasaland Joint Publications Bureau. pp. ix + 118, 64 figs. 1955. London: William Heinemann Medical Books Ltd., 99, Great Russell Street, W.C.1. [15s.]

In her foreword Miss Scott explains that this book consists of notes compiled to refresh the memory of Hospital Assistants trained at the African Medical Training School in Lusaka, Northern Rhodesia.

For this purpose it is probably adequate and may be excellent but the book's general usefulness is considerably lessened by the unevenness of its standard. In many comparatively simple conditions and procedures explanations of methods are given. In others—more complicated—it appears to have been assumed that the Hospital Assistant needs no reminder of the reason for such treatments or of the details of methods used, so that the reader who is not really conversant with the teaching at Lusaka finds himself constantly asking "why?" or "how?"

One small example of this: a Hospital Assistant who almost certainly accepts the wearing of clothes as a quite natural thing is told why they are worn, but the same man—who may still find it difficult to accept the practice of sleeping with his bedroom windows open—is told that he should do so, but no reason is given. There are many other examples of this kind which, though in themselves details, together make it difficult to understand the reasoning behind these variations.

The book has so many good points that it seems worthwhile to suggest that in any future editions it should be made more suitable for use in other parts of Africa by greater care in these details.

It would also add to the usefulness of the book if in such chapters as 12 and 13 some definite indication were given as to the responsibilities of the Hospital Assistant in the treatments described, particularly clarifying which, if any, of these he would be expected to perform himself and which would be carried out by a Medical Officer.

The conversion of these notes into a manual which could be used by Hospital Assistants everywhere would indeed be a valuable addition to the small number of textbooks available for this group. Miss Scott is well qualified to prepare such a textbook and it is to be hoped that she will consider doing so by a revision of the present volume.

Florence N. Udell

CHAUSSINAND, Roland. **La lèpre.** 2nd Edition. 310 pp., 130 figs. (18 coloured). 1955. Paris 6^e: Expansion Scientifique Française, 15, Rue Saint-Benoit. [3,800 fr.]

This edition of Dr. Chaussinand's well-known book on leprosy [see this *Bulletin*, 1951, v. 48, 937] is considerably enlarged, has broader pages, better type, and in place of 75 figures, has now 130, of which 18 are in colour. To the original 9 sections (besides appendices) 3 new sections have been added, on immunological and serological tests, classification, and epidemiology. The section on treatment is almost entirely rewritten, chaulmoogra oil, instead of appearing as the principal treatment, being now relegated to the position of an accessory, useful in producing aesthetic results in some tuberculoid lesions, and in painful neuritic conditions. The treatment of choice is DDS given daily by mouth, the maximum dose being 2 mgm./kgm. of body weight. Only if this daily treatment is not

possible should weekly or bi-weekly (oral or by injection) treatment be resorted to. The thiosemicarbazones are mentioned as the second basic form of treatment, to be used only temporarily in patients intolerant to DDS. The clinical section is very clear in its descriptions and illustrations of the various forms of lesions. The "borderline" case, seldom understood, is plainly described, and it is said to yield as readily to treatment as the major tuberculoid.

In the section on prophylaxis the theory of relative crossed protection between tuberculosis and leprosy is argued clearly and at length. The use of BCG for prophylaxis in leprosy should be studied, especially in regions where the endemicity of leprosy is high, or the future extension of tuberculosis is a grave menace.

This book is strongly recommended to all engaged in leprosy work and who are able to read French. The arrangement is convenient, the style clear, and the photographs of patients with the descriptions alongside make it easy to understand the appearances and nature of leprosy lesions. The author has gathered his information and many of his illustrations from those engaged in leprosy research all over the world, and has woven these together with his own wide experience of leprosy in Indo-China and in France into a clear picture of the disease in all its aspects.

Ernest Muir

DUBOIS, A. **La lèpre. Diagnostic et traitement.** [Diagnosis and Treatment of Leprosy] 72 pp., 1 coloured pl. & 15 figs. 1955. Brussels: M. Weissenbruch S.A., 49, rue du Poinçon.

This small book is written from the author's long experience of leprosy in the Belgian Congo. In that country the campaign against leprosy is being pursued with great vigour, and the Government has appointed leprologists and placed large quantities of sulphones at their disposal; the Red Cross and the Father Damien Foundation are also extending their activities; hence the need of this book which gives the essentials about diagnosis and treatment simply and clearly. After a few paragraphs on history and geography, aetiology is discussed shortly. Under pathology the host-bacillus relationship is treated under 5 classes of subjects: (1) refractory subjects in whom there is complete escape from the disease; the rôle of tuberculosis in bringing this about has yet to be established; (2) those in whom the infection is latent; (3) those in whom there are only a few macules of doubtful nature and who are regarded as "suspects"; (4) those with few bacilli and a benign form of the disease, generally classified either as tuberculoid or indeterminate, and of whom consist 80 to 85 per cent. of cases in the Belgian Congo; (5) malignant leprosy with many bacilli.

The descriptions and illustrations combined make it easy to recognize the different kinds of lesions, distinguish leprosy from other diseases and

classify the different types. Exception is taken to the Madrid Congress classification which includes all non-lepromatous flat lesions as indeterminate; many of these should be designated "simple". An adequate account is given of treatment, DDS being recommended as the drug of choice.

Prophylaxis is dealt with shortly in 1 page. In the appendix such subjects as staining, lepromin, leprosy of the eye, estimation of sulphone concentration, treatment with iron preparations, are explained in more detail.

[The author makes no claim to have written a textbook, but he has succeeded well in accomplishing his object of supplying clearly and concisely all the information necessary for diagnosing and treating leprosy.]

Ernest Muir

We record with great regret the death on 13th December of P. A. BUXTON, C.M.G., M.A., M.R.C.S., L.R.C.P., D.T.M. & H., F.R.S., Professor of Medical Entomology in the University of London since 1933 and Member of the Honorary Managing Committee of the Bureau of Hygiene and Tropical Diseases since 1944.